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FURTHER STUDIES ON THE MINIMAL THRESHOLD OF CHRONIC ENDEMIC DENTAL FLUOROSIS[1]

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Late in 1933 an investigation was begun to determine what constitutes a permissible amount of fluoride in a domestic water supply. A mean annual fluoride content of the domestic water supply was determined for each of a group of 10 cities. Twelve consecutive monthly water samples were sent by each of these cities to the National Institute of Health for chemical analyses. The results of the chemical study revealed the following range in fluoride concentration, the mean annual fluoride content of each common water supply being expressed in parts per million of fluorine (F): Pueblo, Colo., 0.6; Big Spring, Tex., 0.7; Mullins, S. C.. 0.9; Monmouth, Ill., 1.7; Galesburg, Ill., 1.8; Colorado Springs, Colo., 2.5; Plainview, Tex., 2.9; Amarillo, Tex., 3.9; Conway, S. C., 4.0; and Lubbock, Tex., 4.4. Clinical examinations were recorded in each of these cities and the results of the investigation were published in two reports (*1*, *2*).

A careful analysis of these and subsequent data (*3*) indicated a definite quantitative relationship between the fluoride concentration and the clinical manifestations of dental fluorosis. There was an orderly uniformity in the group response to the fluoride concentration of the communal water supply with regard both to the incidence and the percentage distribution of severity, particularly the latter. With this fact demonstrable, it seemed desirable to focus further attention on the minimal threshold of toxicity, or the maximum amount of fluoride permissible in a domestic water supply.

PRESENT STUDY

For this study, four additional communities were selected in the autumn of 1935 for detailed quantitative study. These cities were Clovis, N. Mex., Webster City, Iowa, East Moline, Ill., and Junction

[1] From Division of Infectious Diseases and Division of Chemistry, National Institute of Health.

City, Kans. A report of the survey of these four cities, prefaced by a description of their common water supplies, follows:

DESCRIPTION OF THE COMMON WATER SUPPLIES [1]

Clovis, N. Mex.—The common water supply is obtained from three 32-inch, 340-foot wells operated by the New Mexico Utilities Co. All wells are cased their entire depth and apparently obtain water from the "third stratum". There are no "strainers" or perforations in the casings which would permit mixing of water from the first or second stratum. In 1933 the water level stood at about 250 feet below the surface, and prior to that time had been stationary; since then it has fallen 9 feet.

One well was drilled in 1931, one in 1926, and one (city well no. 1) prior to October 1925, when the present operators took over the property from the city. Topographically the wells are located in a triangulated outline, the vertices, marking the location of the wells, being about 200 to 250 feet apart.

Prior to 1925, the municipal water supply was obtained from two "big" wells, 32 inches in diameter and 340 feet deep, known as "city well no. 1" and "city well no. 2", and from four "small" wells, approximately 300 feet deep, one 6 inches in diameter, the other three, 4 inches in diameter. The four "small" wells were abandoned in 1927; "city well no. 2" was abandoned in 1930. Between October 1925 and 1927 about 70 percent of the water supply was obtained from the two 32-inch, 340-foot wells taken over from the city. The remainder came from the 4 "small" wells.

Webster City, Iowa.—The common water supply is obtained from two deep wells which differ markedly in depth. They are municipally operated. No. 1 is a 10-inch well put in service in 1924 and has been in continuous use since that date. This well is 1,805 feet deep and cased to a depth of 1,520 feet. There are no "slots" or perforations in the casing which would permit mixture of water from higher levels. Water is apparently obtained from three water-bearing sands, 46 feet, 56 feet, and 65 feet in thickness, respectively, located between the 1,605- and 1,790-foot levels. The highest of these aquiferous sands is approximately 150 feet below the St. Peter sandstone. It might be noted that the drilling log indicated that no water was obtained from the St. Peter sandstone in this particular locality.

Well no. 2 is a 12-inch, 120-foot well, likewise drilled in 1924 and in continuous use since that date, with the exception of the period between February 1930 and November 1, 1932. During 1932 this well was deepened from 110 feet to 120 feet. According to the water superintendent, well no. 1 furnishes about two-thirds of the city water, the remainder being supplied by well no. 2.

The water superintendent states that the 12 monthly samples sent to the National Institute of Health were taken from a tap on the high surface pump discharge. This tap is located on a line between the "clear" reservoir and the distribution mains and pressure storage tanks. A water sample from this source is representative of that used by the inhabitants. Samples were generally collected in the forenoon. As a rule, well no. 1 is pumped from midnight to noon and well no. 2 from noon to midnight.

A large number of individual shallow wells are used in the East School district.

[1] The description and data concerning these municipal water supplies were furnished by Messrs. A. J. Whiting, vice president, New Mexico Utilities Co., Clovis, N. Mex.; E. R. Compton, city manager, Webster City, Iowa; Arnold Neihaus, East Moline, Ill., and Arthur Rathert, water superintendent, Junction City, Kans. The authors are likewise indebted to these officials for their assistance in collecting and forwarding the monthly water samples.

East Moline, Ill.—The common water supply of East Moline is obtained from two deep wells, municipally operated. Well no. 1 was installed in 1895, and at that time was 1,300 feet in depth; well no. 2 was drilled in 1911 to a depth of 1,371 feet. In 1913 both wells were deepened, no. 1 to a depth of 1,532 feet, no. 2 to 1,850 feet. There had been no changes in the physical set-up between 1913 and the date of the survey, November 1936. Both wells furnish approximately equal amounts to the city supply. Water from the two wells is pumped by air lift into a collecting reservoir, from which it is pumped into the distribution system. Two elevated steel tanks connected with the distribution system have a capacity of 100,000 and 500,000 gallons, respectively.

No local information was obtainable as to the depth of casings or strata from which water is apparently being obtained. During July and August it has been customary to augment the East Moline supply by obtaining some water from the nearby village of Silvis. This supplemental supply amounts to about one-third of the water used by the inhabitants of East Moline during these 2 months. The Silvis supply is obtained from one deep well, 1,985 feet in depth, and from one shallow well, 35 to 40 feet deep. The city clerk of East Moline states, however, that the monthly samples forwarded to the National Institute of Health should not show the possible effects of this change as the East Moline samples were in all cases collected from the East Moline Reservoir. Inasmuch as the distribution systems of the two communities connect at a point some distance from the reservoir, whatever water East Moline might obtain from Silvis should not pass through the East Moline Reservoir.

Junction City, Kans.—The common water supply of Junction City is obtained from three 60-foot wells, installed in August 1924 and in constant use since that date. These wells are concrete cased; the outside casing is 24 inches in diameter, the inside 18 inches. There are strainers in the lower 20 feet of the casing, the upper 40 feet being plain concrete casing. All three wells are located near the Republican River; well no. 1 is about 100 feet from the river, well no. 2 about 200 feet, while well no. 3 is located in the old Republican River Basin, which is now about 125 feet from the present river bank. Each well has a direct-connected deep-well turbine pump and motor. The water is pumped into a collection reservoir from which point the high-service pumps deliver the water to the city distribution system. On the suction side of the high service pumps, chlorine is introduced in varying amounts.

The drilling log indicates that the wells pass through about 25 feet of clay and 15 feet of very fine gravel, while the lower 20 feet is composed of fine to coarse gravel resting on a limestone stratum. The water level in the three wells correlates with the height of water in the nearby Republican River.

METHOD OF CLINICAL SURVEY [3]

Standards of clinical survey, previously described (*1*), were followed. In this particular study the age group consisted of the 9-, 10-, and 11-year old children, the age grouping being by last birthday. In order to confine the study group exclusively to those children constantly exposed to the risk of the disease, all children who stated that they had not lived in the city continuously since birth (30 days in a calendar year excepted), or had not used the municipal water exclusively, were

[3] The field survey at Clovis, N. Mex., was made during March 1936, that at Junction City, Kans., in May 1936, and the surveys at East Moline, Ill., and Webster City, Iowa, were made during November 1936.

eliminated. The remainder were then further questioned as to their residence and drinking-water history. This cross-questioning often revealed breaks in continuity of residence, such as living for a time at some nearby town or farm, or vacations away from home in excess of 30 days. There are, furthermore, some instances in which children lived in the community continuously but had obtained their domestic water from other than the public supply. Children whose histories indicated any of these discontinuities were eliminated from further study.

All examinations were made in a good light with the child facing a window. At Webster City, East Moline, and Junction City, mouth mirrors free from blemishes and new explorers (SSW no. 5, or equal) were used in making the examinations. In these three cities, in addition to mottled enamel, other defects of the enamel such as caries, present or past (fillings), pits and fissures, hypoplasias, etc., were recorded on an individual record form, reproduced in a previous report (*1*).

At Clovis, the diagnosis of the degree of mottled enamel severity was based on a careful visual examination without the aid of mouth mirrors. The observations were recorded by the "cross five" method on a tally sheet designed for mottled-enamel surveys. The signs of chronic endemic dental fluorosis are so objective that little variation in incidence is noted in using either one or the other of these methods.[4] In this particular city the recording of the detailed results of each examination on an individual record form and then verifying the history as given by each child by an interview with the child's parent would have been purposeless in view of the interfering variable in the physical set-up of the water supply. There is no object in expending time and effort in obtaining the data upon which an "actual" mottled enamel index is computed when major changes in the water supply contravene subsequent correlation with the chemical findings. Whether or not the four "small" wells abandoned in 1927 and "city well no. 2," abandoned in 1930, contained a greater or lesser amount of fluoride than the present supply, is, of course, at this time conjectural. The computation of an "actual" mottled-enamel index of a community is justified only in such communities as possess the requisites for quantitative evaluation (*2*).

[4] For instance, in 1935 a test was made of the two methods at Colorado Springs, Colo. In this city there are 10 public grade schools, 5 east of Monument Creek and 5 west of the creek. In the 5 schools east of Monument Creek there were seventy-nine 9-year-old children who stated that they had resided in the community continuously since birth and had always used the city water supply. An examination of this group using a mouth mirror and explorer disclosed an incidence of 67 percent. An examination of 69 children of the same age and comparable to the first group as to residence and water history in the 5 schools west of Monument Creek, using the method of careful visual examination without mouth mirrors, showed an incidence of 68 percent.

Following the examinations at Webster City, East Moline, and Junction City, the home of each child was visited and the information recorded on the schedule (*1*) under "Water history" was carefully rechecked by an interview with the child's parent for the purpose of later computing an "actual" mottled-enamel index of the community. This recheck often revealed additional inaccuracies in residence or water supplies which the child either did not know or had forgotten. Under the conditions of this survey in the three cities above mentioned, it was possible to find only 19.4, 27.9, and 26.2 percent, respectively, of the children who could demonstrate a continuous residence and an exclusive use of the city water during their lifetime. A previous survey (*1*) of four other cities, but limited to the 9-year-old group, showed 20.4, 20.8, 21.3, and 22.8 percent with verified continuous residence and constant use of the communal water supply. The striking fact that such a high percentage of school children shows discontinuities in residence or noncontinuous use of a common water supply cannot be overstressed in mottled-enamel surveys made for the purpose of determining the incidence associated with a particular fluoride concentration or of subsequent computation of a mottled-enamel index. A survey of a group of school children, without adjusting for this time-of-exposure factor, naturally results in a rate of affection considerably less than the actual rate.

The results obtained are summarized in tables 1, 2, and 3.

TABLE 1.—*Summary of data with relation to continuity of residence and concomitant use of the communal water supply*

	Clovis, N. Mex.	Webster City, Iowa	East Moline, Ill.	Junction City, Kans.
(1) Number of grade public schools in city	2	5	5	3
(2) Number of grade public schools in which examinations were held	2	5	5	3
(3) Number of 9-, 10-, and 11-year old pupils in attendance in (2) on date of examination	424	242	336	[1] 355
(4) Number of pupils in (3) whose histories on questioning indicated constant residence and concomitant use of communal water supply and who were examined	138	72	110	115
(5) Percentage of age group present examined under (4)	32.5	29.7	32.7	32.4
(6) Number of schedules eliminated by house-to-house recheck	----------	25	16	22
(7) Percentage of total present showing constant residence and water history	----------	19.4	27.9	26.2

[1] There were actually 415 children present, but about 20 in each age group (60 in all) were children from Fort Riley, a nearby military reservation; 355 represent approximately the actual number of Junction City residents present.

TABLE 2.—*Distribution according to severity of dental fluorosis in those examined in item 4 of table 1*

City	Number of children examined	Children classified according to mottled enamel diagnosis							Incidence per 100 children
		Normal	Questionable	Very mild	Mild	Moderate	Moderately severe	Severe	
		Number							
Clovis, N. Mex.	138	18	22	33	49	15	1	0	71.0
Webster City, Iowa	72	47	6	16	3	0	0	0	26.4
East Moline, Ill.	110	61	22	20	6	1	0	0	24.5
Junction City, Kans.	115	110	3	2	0	0	0	0	1.7
		Percent							
Clovis, N. Mex.	138	13.1	15.9	23.9	35.5	10.9	0.7	0	71.0
Webster City, Iowa	72	65.3	8.3	22.2	4.2	0	0	0	26.4
East Moline, Ill.	110	55.5	20.0	18.2	5.4	0.9	0	0	24.5
Junction City, Kans.	115	95.7	2.6	1.7	0	0	0	0	1.7

TABLE 3.—*Distribution according to severity of dental fluorosis in those remaining after recheck (see item 6 of table 1)*

Cit	Number of children examined	Children classified according to mottled enamel diagnosis							Incidence per 100 children
		Normal	Questionable	Very mild	Mild	Moderate	Moderately severe	Severe	
		Number							
Clovis, N. Mex.[1]									
Webster City, Iowa	47	26	5	13	3	0	0	0	[2] 34.0
East Moline, Ill.	94	51	19	18	5	1	0	0	25.5
Junction City, Kans.	93	90	1	2	0	0	0	0	2.1
		Percent							
Clovis, N. Mex.									
Webster City, Iowa	47	55.3	10.7	27.7	6.3	0	0	0	34.0
East Moline, Ill.	94	54.3	20.2	19.1	5.3	1.1	0	0	25.5
Junction City, Kans.	93	96.8	1.1	2.1	0	0	0	0	2.1

[1] Clovis data was not rechecked; see text.

[2] The increase in incidence of affection from 26.4 to 34.0 percent as a result of the house-to-house recheck is the largest yet recorded in surveys of this type. The large number of shallow wells in use no doubt contributes to this increase.

RESULTS OF CHEMICAL ANALYSIS

As has been noted previously, samples of the waters were obtained monthly. The fluoride content was estimated colorimetrically by means of the zirconium-alizarin reagent (*4*). The results obtained are given in table 4.

TABLE 4.—*Fluoride (F) content of monthly samples*

Month and year	Clovis	Webster City	East Moline	Junction City
	Parts per million			
1935				
December	2.1	1.6	1.6	0.7
1936				
January	2.2	1.5	1.6	.7
February	2.3	1.5	1.6	.7
March	2.3	1.6	1.5	.7
April	2.3	1.6	1.5	.7
May	2.3	1.6	1.5	.7
June	2.1	1.6	1.6	.7
July	2.1	1.6	1.6	.7
August	2.2	1.6	1.5	.7
September	2.2	1.5	[1] 1.0	.6
October	2.1	1.5	1.6	.6
November	2.1	1.5	1.6	.6
Mean annual fluoride content	2.19	1.56	[1] 1.51	.67

[1] When the abrupt change in fluoride content of the September sample was noted, inquiry was made as to a possible explanation. Mr. Arnold Neihaus, city clerk of East Moline, furnished the information that 1 of the wells was not used during that time on account of a broken pump. In order to have information as to possible fluctuation in fluoride content on account of the use of only 1 of the wells, samples from each well were sent by Mr. Neihaus for analysis. These results showed that the water from the well used when the September sample was taken had a fluoride (F) content of 1.0 part per million, while the water from the other well showed a fluoride (F) content of 1.6 parts per million. According to local information, each well contributes about equal amounts to the municipal supply. But as indicated by the fluoride figures, the samples sent us apparently were chiefly representative of one or the other of the 2 wells and not an equal mixture of the 2. Hence, the arithmetical mean annual fluoride content might be in the neighborhood of 1.3 parts per million instead of the 1.5 parts per million shown in table 4.

Similar determinations (on single samples) of the fluoride content of the water from each of the 2 wells supplying Webster City, showed that the fluoride (F) content of one was 1.8 parts per million, while that of the other was 1.3 parts per million.

As was customary in other quantitative surveys, analyses were made of constituents of the water other than the fluorides. Results of the chemical analyses of the waters are given in table 5.

TABLE 5.—*Analyses of the waters*[1] *used*

	Clovis	Webster City	East Moline	Junction City
	Parts per million			
Residue on evaporation	265.8	729.0	1,128.6	400.5
Loss on ignition	23.3	126.8	46.5	36.2
Fixed residue	242.5	602.2	1,082.1	364.3
Silica (SiO_2)	35.9	14.5	12.2	27.7
Iron (Fe)	.02	.18	.08	.04
Aluminum (Al)	.2	.4	.1	.3
Calcium (Ca)	25.7	105.5	54.3	83.5
Magnesium (Mg)	21.8	50.5	25.7	17.9
Sodium and potassium (calculated as Na)	40.2	60.2	309.3	29.7
Bicarbonate (HCO_3)	234.9	406.9	308.0	294.6
Sulphate (SO_4)	24.2	235.6	290.9	45.9
Nitrate (NO_3)	7.9	3.5	3.0	4.8
Chloride (Cl)	16.5	25.0	259.0	31.0
Fluoride (F)	2.2	1.5	1.4	.7
Phosphate (PO_4)	0	.2	0	.2
Boron (B)	0	0	0	0

[1] The sample of water from Clovis was collected in September 1935, the East Moline and Webster City samples in October 1935, and the Junction City sample in November 1935.

Assistant Chemist C. G. Remsburg carried out the determinations other than fluoride and boron, using mostly the methods given in the Standard Methods of Water Analysis of the American Public Health Association. The boron determinations were made essentially by the method of Foote (*5*).

Check analyses on the mineral content, comprising determinations of total solids, alkalinity, chloride, and sulphate, were made on each of the monthly samples. The results indicated that the gross mineral composition was practically uniform in all of the monthly water samples from each community, with the exception of the September sample from East Moline. (See footnote to table 4.)

DISCUSSION

There are numerous references in the literature to surveys of mottled enamel areas in which little data is submitted relative to the size of the sample, the age distribution, or the continuity of exposure of the group upon which inferences are postulated. In surveys of communities with populations of 1,500 or less, the adequacy of the sample becomes one of paramount importance. Even though all 9-, 10-, 11-, and 12-year-old children of continuous residence and a history of constant use of the common water supply are examined, the group is generally so small that extreme caution is warranted in interpreting the results. Comments relative to a few of these observations follow.

EFFECT ON INCIDENCE OF AGE GROUPING OF SAMPLE

Analyses of data from numerous surveys indicate that when dealing with fluoride (F) concentrations between 1.0 and approximately 2.5 parts per million, an examination of the 9-year-old children exclusively shows a lower incidence than when the examination includes the 9-, 10-, and 11-, or the 9-, 10-, 11-, and 12-year-old children. A possible explanation of this phenomenon has previously been suggested (*3*):

> Two related factors are probably the cause of this somewhat lower incidence in a survey limited to the 9-year-age group. First, in endemic areas of relatively low fluoride concentration (less than 2 parts per million) there is, in a fair proportion of the children of comparable and constant residence and water history, a tendency to show the milder forms of mottled enamel only on the bicuspids and second molars, a group of teeth which, according to Kronfeld (Development and Calcification of the Human Deciduous and Permanent Dentition. The Bur, March 1935) begin their calcification at a somewhat later date than the incisor-first molar group. This manifestation of mild dental fluorosis in teeth calcified at a somewhat later date is suggestive of a cumulative action of fluorine. Second, based on an analysis of the 162 schedules of the Colorado Springs-Pueblo survey (*1*) only about 1 percent of the permanent second molars, 7.2 percent of the second bicuspids, and 20.5 percent of the first bicuspids were erupted in the 9-year-age group. It follows, therefore, that certain 9-year-old children are necessarily classified as normal on the basis of the absence of mottled enamel on the incisor-first molar group when, if the same individual were examined a year or two later, it might show objective signs of mottled enamel on the bicuspid-second molar group and be so classified.

Illustrations of this tendency may be seen in table 6.

TABLE 6.—*Difference in the percentage incidence between samples composed of 9-year-old children exclusively and samples consisting of 9-, 10-, and 11-year-old children*

City and State	Mean annual fluoride content (p. p. m.)	9-year-old children		Composite of 9-, 10-, 11-year-old children		Difference in incidence
		Number examined	Incidence per 100 children	Number examined	Incidence per 100 children	
Pueblo, Colo.	0.6	83	2.4			
Junction City, Kans.	.7	38	2.6	115	1.7	−0.9
East Moline, Ill.	1.5	42	19.0	110	24.5	+5.5
Webster City, Iowa	1.6	33	15.1	72	26.4	+11.3
Monmouth, Ill.	1.7	38	42.1			
Clovis, N. Mex.	2.2	45	57.7	138	71.0	+13.3
Colorado Springs, Colo.	2.5	79	67.1			
Plainview, Tex.	2.9	30	86.6	77	87.0	+.4
Amarillo, Tex.	3.9	77	87.0	229	89.5	+2.5
Conway, S. C.	4.0	23	86.9	59	88.1	+1.2
Lubbock, Tex.	4.4	70	95.7	164	97.6	+1.9

NOTE.—In the observations listed in table 6, the histories elicited from each child by careful cross-questioning indicated constant residence and continuous use of the common water supply. This is the standard, followed in recording the data used in determining the "approximate mottled enamel index" (*6*). The variation in the incidence between this method and that of verifying each history by an interview with the child's parent (actual mottled enamel index) is generally of minor importance. In the cases of Junction City, East Moline, and Webster City, the differences may be noted in tables 2 and 3. The variation with respect to Pueblo, Monmouth, and Colorado Springs has been reported in a previous publication (*1*). In Conway the house-to-house recheck had a negligible effect on the group incidence, the 59 cases shown in table 6 revealing an incidence of 88.1, while the 26 verified rechecked schedules showed an incidence of 88.4 per 100 children.

COMPARISON OF PRESENT STUDY WITH A PREVIOUS ONE

Keeping in mind the probabilities of a somewhat lower percentage incidence of affection in certain samples limited to 9-year-old children (see table 6), it seems desirable to compare the findings of this study with one previously reported (*1*). As the earlier work (Colorado Springs-Monmouth-Pueblo) was limited to the 9-year-age group, the comparison will be made only with the same age group in Webster City, East Moline, and Junction City. In the 213 observations listed, each child was born in the community, lived there all of his or her life, used the communal water supply continuously for both drinking and cooking; and the facts in each instance were verified by one of us (HTD) by an interview with the child's parent.

TABLE 7.—*Relation between the fluoride (F) concentration and clinical effect in 9-year-old children with verified histories in 6 selected cities*

City and State	Number examined	Mean annual fluoride (F) content of common water supply (p. p. m.)	Incidence per 100 children
Colorado Springs, Colo.	54	2.5	66.6
Monmouth, Ill.	[1] 29	1.7	48.3
Webster City, Iowa	[1] 20	1.6	25.0
East Moline, Ill.	[1] 35	[2] 1.5	17.1
Junction City, Kans.	[1] 30	.7	3.3
Pueblo, Colo.	49	.6	4.0

[1] The number examined in these 4 cities was less than our minimal requisite of 50 when the incidence is less than 75 percent, but represents all of the children of this specific age group present in the public schools on the day of the examination who had a verified history of constant residence and continuous use of the municipal water. For importance of size of samples, see table 8.

[2] See footnote, table 4.

SAMPLING LIMITS

In evaluating the degree of reliability attached to percentage incidences computed on groups not meeting the present minimal requirements as to size, it is well to bear in mind the probability of fluctuation in small samples. Extensive data distributed over an adequate number of surveys have not as yet been accumulated in amounts sufficient to warrant the development of sampling limits in relation to waters of different fluoride concentrations. The magnitude and composition of the sample naturally bears a direct relationship to the percentage of affection of the particular endemic area being studied.

Pending the collection of further data we follow this standard with respect to size and composition of the sample used in the computation of an "actual" or an "approximate" community mottled enamel index.[5] The group examined is limited to children who since birth have continuously used the common water supply for both drinking and cooking, breaks in continuity totaling less than 30 days in any one calendar year being excepted.

Actual mottled enamel index.—The sample of children upon whom the index is based must consist of 25 or more, 9 years of age or older. Whenever possible, the sample should consist of 9-, 10-, 11-, and 12-year-old children, represented in approximately equal numbers. In instances where the examination of the first 25 reveals an incidence of less than 75 percent, the size of the sample must be increased to 50 or more to compensate for fluctuations in sampling. All histories as given by the child with respect to both residence and water supplies must be rechecked and confirmed by an interview with the child's parent. This index is computed only when there have been no relevant changes in the physical set-up of the common water supply concomitant with the life period of the group examined.

Approximate mottled enamel index.—The minimal requisites with respect to numbers examined and age distribution as given for an "actual mottled enamel index" are followed, but individual histories are not rechecked by an interview with the child's parent. The approximate mottled enamel index is particularly useful in routine surveys.[6] Numerous surveys have shown that after careful cross-questioning of each individual child, the remaining error with respect

[5] This index is merely a numerical ratio (7) of measurement that points out the approximate percentage distribution of clinical severity observed in the group at the time of the examination.

[6] In surveys of small communities we have frequently computed what is known as a "tentative mottled enamel index" as the number of children with continuity of exposure is insufficient to compute an "actual" or "approximate" index. The sample in this instance consists of not less than 10 but not more than 24 children.

to either residence or water history is largely compensatory and the house-to-house recheck as required for the "actual mottled enamel index", results in little change in either the percentage of affection or the percentage distribution of severity of the group as a whole.

Instances of fluctuation in incidence in samples of different sizes and combinations in the case of four cities with mean annual fluoride (F) contents of 4.4, 3.9, 2.5, and 1.5 [7] parts per million, respectively, are shown in table 8.

TABLE 8.—*Examples of fluctuation in percentage incidence in samples of different sizes and combinations in (a) the same endemic area, and (b) endemic areas showing different fluoride concentrations*

Age group	Number of children examined	Designation of school	Classification of mottled enamel diagnosis							Incidence of mottled enamel per 100 children
			Normal	Questionable	Very mild	Mild	Moderate	Moderately severe	Severe	
Lubbock, Tex. Mean annual fluoride (F) content, 4.4 p. p. m.										
9-year-old children	20	School A	0	1	4	6	7	2	0	95
	18	School B	1	0	2	3	8	4	0	94
	19	School C	0	1	1	4	10	2	1	95
	13	Schools D [1]	0	0	1	5	6	1	0	100
	70	All schools	1	2	8	18	31	9	1	95.7
		Percentage incidence in different combinations								
		Schools AB (38) 95; Schools AC (39) 95; Schools AD (33) 97; Schools BC (37) 95; Schools BD (31) 97; Schools CD (32) 97; Schools ABC (57) 95; Schools ABD (51) 96; Schools BCD (50) 96; Schools CDA (52) 96								
Amarillo, Tex. Mean annual fluoride (F) content, 3.9 p. p. m.										
9-year-old children	19	School A	1	3	3	5	4	3	0	79
	17	School B	0	0	2	8	7	0	0	100
	25	School C	1	3	3	7	9	2	0	84
	16	School D	2	0	2	3	6	2	1	87
	77	Schools A, B, C, D	4	6	10	23	26	7	1	87
		Percentage incidence in different combinations								
		Schools AB (36) 89; Schools AC (44) 82; Schools AD (35) 83; Schools BC (42) 90; Schools BD (33) 94; Schools CD (41) 85; Schools ABC (61) 87; Schools ABD (52) 88; Schools BCD (58) 90; Schools CDA (60) 83								

[1] Schools "D" — a combination of scattering cases from 3 schools.

[7] See footnote to table 4.

TABLE 8.—*Examples of fluctuation in percentage incidence in samples of different sizes and combinations in (a) the same endemic area, and (b) endemic areas showing different fluoride concentrations*—Continued

Age group	Number of children examined	Designation of school	Classification of mottled enamel diagnosis							Incidence of mottled enamel per 100 children
			Normal	Questionable	Very mild	Mild	Moderate	Moderately severe	Severe	
Colorado Springs, Colo. Mean annual fluoride (F) content, 2.5 p. p. m.										
9-year-old children..	13	School A	2	3	3	2	3	0	0	62
	23	School B	7	3	6	4	2	1	0	56
	15	School C	4	2	6	1	1	1	0	60
	15	School D	1	2	4	5	3	0	0	80
	13	School E	1	1	5	2	4	0	0	85
	79	Schools A, B, C, D, E	15	11	24	14	13	2	0	67.1
		Percentage incidence in different combinations								
		Schools AB (36) 58					Schools ABC (51) 59			
		Schools AC (28) 61					Schools ABD (51) 65			
		Schools AD (28) 71					Schools ABE (49) 65			
		Schools AE (28) 73					Schools BCD (53) 64			
		Schools BC (38) 58					Schools BCE (51) 65			
		Schools BD (38) 66					Schools CDE (43) 74			
		Schools BE (36) 67					Schools CDA (43) 67			
		Schools CD (30) 70					Schools DEA (41) 76			
		Schools CE (28) 71					Schools DEB (51) 71			
		Schools DE (28) 82					Schools EAC (41) 68			
East Moline, Ill. Mean annual fluoride (F) content, 1.5 p. p. m.[1]										
9-, 10-, and 11-year-old children.	24	School A	14	5	3	2	0	0	0	21
	40	School B	22	8	9	1	0	0	0	25
	19	School C	11	1	6	1	0	0	0	37
	10	School D	5	2	1	1	1	0	0	30
	17	School E	9	6	1	1	0	0	0	12
	110	All schools	61	22	20	6	1	0	0	24.5
		Percentage incidence in different combinations								
		Schools AB (64) 23					Schools ABC (83) 26			
		Schools AC (43) 28					Schools ABD (74) 24			
		Schools AD (34) 23					Schools ABE (81) 21			
		Schools AE (41) 17					Schools BCD (69) 29			
		Schools BC (59) 29					Schools BCE (76) 25			
		Schools BD (50) 26					Schools CDE (46) 26			
		Schools BE (57) 21					Schools CDA (53) 28			
		Schools CD (29) 34					Schools DEA (51) 20			
		Schools CE (35) 25					Schools DEB (67) 22			
		Schools DE (27) 19					Schools EAC (60) 23			

[1] See footnote to table 4.

NOTE.—Number in parenthesis following each combination indicates the size of the sample.

APPLICABILITY OF THE SEVEN-GRADE CLASSIFICATION OF DIAGNOSIS

In 1934 there was published a classification of mottled enamel diagnosis (*8*). At that time the classification was based upon approximately 2,000 observations made in endemic areas of six different States. The primary purpose in developing this classification was to provide a standard of measurement for recording the degree of severity

as observed in communities whose water supplies contained various concentrations of fluorides. To date, its applicability has been tested by one of us (HTD) in more than 10,000 examinations in about 185 areas distributed among 16 States. A large majority of these were endemic areas; but in connection with these surveys the classification has, of course, been applied in the study of borderline and negative, or "control", areas.

Certain objections have been raised to the use of this classification on the grounds that seven grades tend to make the classification complex. Some have suggested a classification of "mild", "moderate", and "severe" in the interest of simplification. This proposal is evidently based on the erroneous assumption that the entire classification is to be used in a survey of any particular endemic area. Such is not the case.

In considering the simplified classification, "mild", "moderate", and "severe", we would naturally have to add a fourth grade, "normal" in order to obtain the figure upon which the percentage incidence might be computed, or to show that the recorded frequency of occurrence of mottled enamel plus the frequency of no mottled enamel equals the total number of observations. In other words, it may be taken for granted that the classification could not be reduced to less than four grades under any conditions.

Those who would simplify the classification would omit the "questionable", "very mild", and "moderately severe" grades. The quantitative aspects of a survey would probably be entirely lost, or judged erroneously, if the "questionable" cases were thrown into one grade or another of the proposed four-grade classification. Similarly, the omission of the "very mild" and "moderately severe" grades would probably seriously affect the calculation of the community mottled enamel index. This retrogression from quantitative methods would result in abstruse survey data of little value for purposes of comparison with other endemic areas of greater or lesser degree of severity.

An analysis of the data from 15 surveys, totaling 1,542 observations, indicates the flexibility of the seven-grade classification. In these 15 cities, where the percentage incidence ranges from 2.4 to 100, it is noted that more than 90 percent of all diagnoses fall into not more than four grades (arithmetical mean, 95.3; weighted average mean 92.0). A cursory analysis of table 9 makes apparent the flexible features of a seven-grade classification and its applicability to areas of dissimilar degrees of clinical severity.

TABLE 9.—*Illustration of (a) the tendency of mottled enamel diagnoses to fall into 4 grades (as indicated by figures in boldface type), and (b) the adaptability of the 7-grade classification to meet the survey needs in communities having waters of different fluoride concentrations*

City and State	Number of children examined	Mean annual fluoride (F) content in p. p. m.	Percentage incidence of affection	Percentage distribution of clinical severity							Highest percentage of diagnoses falling into not over 4 grades	Age group or school grade examined
				Pathognomonic signs								
				Absent		Present						
				Normal	Questionable	Very mild	Mild	Moderate	Moderately severe	Severe		
Pueblo, Colo	83	0.6	2.4	**88.0**	**9.6**	**2.4**					100.0	9-year old.
Junction City, Kans	115	.7	1.7	**95.7**	**2.6**	**1.7**					100.0	9-, 10-, 11-year old.
Mullins, S. C	47	.9	10.6	**68.1**	**21.3**	**8.5**	**2.1**				100.0	Do.
East Moline, Ill	110	[1] 1.5	24.5	**55.5**	**20.0**	**18.2**	**5.4**	**0.9**			99.1	Do.
Webster City, Iowa	72	1.6	26.4	**65.3**	**8.3**	**22.2**	**4.2**				100.0	Do.
Monmouth, Ill	38	1.7	42.1	**36.8**	**21.0**	**36.8**	**5.3**				100.0	9-year old.
Galesburg, Ill	57	1.8	35.1	**45.6**	**19.3**	**26.3**	**5.3**	**3.5**			95.5	Do.
Clovis, N. Mex	179	2.2	72.1	11.7	**16.2**	**21.8**	**36.9**	**12.3**	1.1		87.2	9-, 10-, 11-, 12-year old.
Colorado Springs, Colo	148	2.5	67.6	**18.2**	**14.2**	**28.4**	**21.6**	**14.2**	3.4		[2] 82.4	9-year old.
Plainview, Tex	97	2.9	87.6	4.1	8.3	**34.0**	**26.8**	**23.7**	3.1		92.8	9-, 10-, 11-, 12-year old.
Amarillo, Tex	289	3.9	90.3	3.1	6.6	**15.2**	**28.0**	**33.9**	**11.1**	**2.1**	88.2	Do.
Conway, S. C	59	4.0	88.2	5.1	6.7	**20.4**	**32.2**	**23.7**	**11.9**		88.2	9-, 10-, 11-year old.
Lubbock, Tex	189	4.4	97.8	1.1	1.1	**12.2**	**21.7**	**46.0**	**15.3**	2.6	95.2	9-, 10-, 11-, 12-year old.
Post, Tex	38	5.7	100.0				**10.5**	**50.0**	**34.2**	**5.3**	100.0	4th, 5th, 6th grades.
Ankeny, Iowa	21	[3] 8.0	100.0				**9.5**	**47.6**	**33.3**	**9.5**	100.0	Second to twelfth grades, inclusive.

[1] See footnote to table 4.
[2] The percentage distribution of severity in decreasing order is equal in the fourth and fifth tabular cell, 14.2.
[3] Based upon a single chemical determination; all others represent arithmetical mean annual fluoride (*F*) content.

CONCLUSION

In accordance with previously described means (*7*) of determining the mottled enamel index of a community, the application of this method to the percentage distribution of severity as listed in table 2 indicates that the approximate mottled enamel index of Clovis, N. Mex., is "slight", that of Webster City, Iowa, and East Moline, Ill., "border line", and that of Junction City, Kans., "negative." The application of these same ratios to the rechecked verified data in table 3 shows that the actual mottled enamel index of East Moline, Ill. is "border line" and that of Junction City, Kans., "negative." The percentage distribution of severity, however, in the case of Webster City, Iowa, shows an approach so close to the next higher index that the actual mottled enamel index of this city should be listed as "border line—slight."

Analysis of the data in this study confirms the previous statement (*3*) that "amounts not exceeding 1 part per million expressed in terms of fluorine (F) are of no public health significance."

SUMMARY

1. The "approximate" mottled enamel index of Clovis, N. Mex., is "slight"; that of Webster City, Iowa, and East Moline, Ill., "border line"; while that of Junction City, Kans., is "negative." The "actual" mottled enamel indexes of East Moline and of Junction City are the same as the approximate indexes; but the "actual" index of Webster City approaches so close to the next higher classification that it is listed as "border line—slight."

2. The mean annual fluoride (F) content based upon monthly examinations of the common water supply received between December 1935, and November 1936, was for Clovis, N. Mex., close to 2.2 parts per million; for Webster City, Iowa, 1.6 parts per million; for East Moline, Ill., 1.5 parts per million (subject to certain corrections which might bring it down to about 1.3 parts per million); and for Junction City, Kans., 0.7 parts per million.

3. Problems of sampling, particularly with respect to adequateness, are discussed and illustrated with examples from surveys of cities whose common water supplies show different fluoride concentrations.

4. The need, for quantitative purposes, of the "seven-grade" classification of mottled enamel diagnosis is shown.

5. Additional evidence is presented that amounts of fluoride (F) not exceeding 1 part per million are of no public health significance.

REFERENCES

(*1*) Dean, H. T., and Elvove, Elias: Studies on the minimal threshold of the dental sign of chronic endemic fluorosis (mottled enamel). Pub. Health Rep., **50**: 1719–1729 (Dec. 6, 1935). (Reprint no. 1721.)

(2) Dean, H. T., and Elvove, Elias: Some epidemiological aspects of chronic endemic dental fluorosis. Am. J. Pub. Health., **26**: 567–575 (June 1936).
(3) Dean, H. T.: Chronic endemic dental fluorosis (mottled enamel). J. Am. Med. Assoc., **107**: 1269–1272 (Oct. 17, 1936).
(4) Elvove, Elias: Estimation of fluorides in waters. Pub. Health Rep., **48**: 1219–1222 (Oct. 6, 1933). (Reprint no. 1596.)
(5) Foote, F. J.: Determination of boron in waters. J. Ind. Eng. Chem., Anal. Ed., **4**: 39–42 (Jan. 15, 1932).
(6) Dean, H. T.: A summary of the epidemiology of chronic endemic dental fluorosis (mottled enamel). Texas Dent. Jour., **55**: 86–93 (March 1937).
(7) Dean, H. T., Dixon, R. M., and Cohen, C.: Mottled enamel in Texas. Pub. Health Rep., **50**: 424–442 (Mar. 29, 1935). (Reprint no. 1678.)
(8) Dean, H. T.: Classification of mottled enamel diagnosis. J. Am. Dent. Assoc., **21**: 1421–1426 (August 1934).

RELATIONSHIP OF A RURAL HEALTH PROGRAM TO THE NEEDS IN THE AREA[1]

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From early colonial days a wholesomeness has been associated with rural and village life. In popular imagination, health, perhaps more than any other attribute, characterizes country folks as compared with their city brethren. While there has been some foundation for this impression in days gone by, still the belief persisted long after significant changes had taken place in urban environments, and after facilities had been perfected for carrying into effect the recently acquired knowledge regarding prevention and treatment of disease.

The first inquiries into rural health conditions of the Southern States revealed a prevalence of intestinal infections and intestinal parasites clearly beyond the limits that would be tolerated in cities. To correct this condition programs of sanitation were inaugurated which emphasized the building of sanitary privies. The impetus given to this movement was so great that it has dominated the program of many southern rural health departments to this very day.

Following the disclosures of these sanitary surveys, inquiries were made concerning physical status, especially of children. The findings were disconcerting, to say the least. Those of particular interest to public health workers of that period were poor nutrition and disease conditions in the structures of the mouth and nose. The public health nurse, who had been such a potent force under urban conditions, was installed in rural areas for the purpose of inducing corrective measures. In this new environment she was expected to accomplish results without the supporting clinic service to which she was accustomed in the city.

In the initial stages of rural health work, beyond which many areas have not yet passed, an administrative officer, usually a local practicing

[1] From Division of Public Health Methods, National Institute of Health, in cooperation with Division of Domestic Quarantine.

physician, was employed by the county, the townships, or the villages, and not infrequently by all three types of political units. Only a small part of the health officer's time was required to discharge his official duties. These seldom included more than the imposition of quarantine measures for the control of communicable diseases and the investigation of complaints which usually grew out of nuisances offensive to sight or smell. It was felt that a great forward step had been taken when the position of health officer was placed on a full-time basis and a lay inspector was employed to promote rural sanitation. Except for supervising the sanitation work and the nursing service, the scope of the health officer's duties was not expanded materially, but within his field a more intensive type of service was inaugurated. With the employment of a full-time health officer, the county by common acceptance is recognized as having an organized health department. Higher degrees of adequacy are attained as a rule by additions to the nursing staff.

Through the years in which county health departments have been in existence, very little effort has been made to appraise the program objectively. It has been assumed, and perhaps rightly so, that the advances in health, as expressed by declining morbidity and mortality rates, must have resulted in part at least from the protective and promotional measures that were put into effect. Only recently the United States Public Health Service inaugurated a series of investigations which should ultimately shed some light on questions concerning the effectiveness of different types of public health service that have been established in rural areas. The first step is to determine in a general way whether local programs follow some standard design, or whether they are shaped specifically to meet the basic health needs of the people.

The local health agency under consideration in the present study may be described as a small county health department consisting of a medical health officer, two public health nurses, and a sanitation officer. They are expected to serve a population of approximately 34,000 people. In the supporting social structure there are 18 physicians and 5 dentists, all of whom might be classed as general practitioners. The study area contains no hospitals or organized clinic facilities for the care of those who are ill. Social welfare service is limited in amount and character, consisting primarily of money grants or work relief for the needy. A few functions which affect health in an indirect way are sponsored by a county agent and by a home demonstration agent. Among the more important items in the promotional programs of these agents may be mentioned gardening, production of milk and eggs, menu planning, housekeeping, and recreation.

The area may be described as two similar rural counties which have pooled their resources to form a single health district. One county seat contains 2,144 inhabitants and the other 1,629. The remaining population is distributed in small villages or in the open country. Approximately one-half of the population are Negroes and the other native white. The great majority of both the white and colored races follow agriculture, and the remainder engage in pursuits that serve the farm population. Cotton, tobacco, and peanuts, in the order mentioned, constitute the principal crops.

The first unit of the present health organization, a sanitation officer, was installed in 1920. One public health nurse reported for duty in 1924, and the second followed in 1928. The position of health officer for one county was placed on a full-time basis in 1924. The present incumbent relinquished an extensive rural practice in 1928 to take over the direction of the newly organized bicounty health department. The total budget of the department is about $12,000. Approximately $2,000 is reserved for travel and incidental expenses, and the remainder is consumed by salaries of the regular staff.

The health department depends on two basic techniques—education and regulation—in the approach to its problem. Education is the chief reliance, but the expressed and implied powers of the health officer may be used in persuasive measures where acts or omissions of individuals endanger community health.

The aforementioned investigation by the United States Public Health Service into rural health programs was pursued in part through the records of the health department. The daily activities, for the term of the study, of the health officer, the nurses, and the sanitation officer were recorded on survey forms for later tabulation and analysis. Departmental records, however, are too bare, too concise, to do justice to the subject. They show only the fact and type of service, not the set of conditions out of which the need for such service grew and in which there may be remaining and unregarded needs. They do not show the problem as a whole, but only that part touched by the health department's program.

So the family survey was devised as a means of arriving at the complete picture. This, as its name implies, is a canvass of a sample of familes, the term "family" as here used including all persons living together in one household. The interviews with the 1,009 families, or households, making up the sample were intended to reveal the conditions under which each of these groups of individuals lived, and the health situation in each household for the study period. Under the first come the nature of the premises, the economic status of the family, and the age and sex composition of the household; under the second the illnesses afflicting the members over the 12-month period of the study, the medical care and all other attention bearing on the health

of the individuals. The informant was especially interrogated regarding the contact that the family had with the health department during the study year; contact, that is, between any individual in the household and any member of the health personnel at whatever place—it might be a talk out in the backyard between the household head and the sanitation officer, or the examination given a crippled child at the orthopedic clinic, or perhaps maternity advice given the mother by the public health nurse in the home.

The sample of families was so chosen that it would embody within its compass those stratifications of conditions of life that cut across the region under consideration. A carefully selected sample, it was thought, would constitute a miniature of this health jurisdiction and its health problems and programs.

Of the 1,009 premises occupied by this sample of families, 268 are located in the 2 county-seat towns, 112 in the villages and hamlets, and 629 in the open country. Those in the country are in part farms and in part simply isolated homes. A number of the rural workers are tenant farmers, who operate on an exceedingly small scale, or sharecroppers, w..o with their families live in a hand-to-mouth fashion.

The range of economic status prevailing in this portion of the country has been divided under the headings of comfortable, moderate, poor, and very poor. So far as was possible, the proportion of each of these classifications to the population as a whole was carried over into the sample of families selected for survey, as was also the proportion of colored persons within each classification. The sample subdivides as follows:

Comfortable: 88 families, about 10 percent of which are Negroes.
Moderate: 420 families, about 30 percent of which are Negroes.
Poor: 374 families, about 68 percent of which are Negroes.
Very poor: 127 families, about 82 percent of which are Negroes.

These classifications by economic status represent ways of living rather than actual income. Among those families said to be in comfortable circumstances, many are not possessed of any considerable means; they are simply better off than their neighbors. In this group are included a relatively small number that could be considered well-to-do. The families in the moderate status are deemed to have a certain margin of security, though not enough to enable them to carry any prolonged financial burden brought about by illness or other adversity.

About half of the families fall in the low income group and appear to live along or below the level of subsistence. They have their clothing, or at least some clothes, their shelter, and meals of a greater or lesser degree of nourishment. Many of these poor are distinctly underprivileged and undernourished. Negroes predominate in this group.

On the whole, the colored people live under less wholesome and less sanitary conditions than do the white. The average size of the white families is 5.0, and the mean number of rooms per family is 5.8. For the Negroes the average size of family is 6.1 and the mean number of rooms 4.2. The small 2- or 3-room cabin is a common dwelling along the streets and highways of this section, sometimes doing duty for one or two persons and sometimes filled to capacity. As might be expected, this overcrowding is most prevalent among the poor and adds to their other problems.

Around 40 percent of the white households and about 18 percent of the colored were recorded by the survey workers as exceptionally clean and tidy. A small percentage were unsightly and unsanitary, and the remainder were clean or fairly so.

THE SANITATION PROBLEM AND THE SANITATION PROGRAM

The investigators were instructed to ascertain on each premises what means served the family for the disposal of excreta, from what source the drinking water came, and to what extent the house was screened. They were to ask the family informant whether the sanitation officer made a visit to the premises during the year which the study covered.

Records of the health department, it might be well to point out here, show that the sanitation program was directed for the most part to the repair, the building, or the rebuilding of privies. The sanitation officer performed other duties, such as the investigation of nuisances or the inspection of public or private water supplies, but the privy program apparently took up most of his time.

In a population such as this, where the income level is very low, the criterion of sanitation must be a simple one. It should include a privy in such a location that seepage therefrom will not endanger the quality of the drinking water, and in such a condition that its contents are not exposed to flies. A well or spring protected from pollution and a house screened against flies and mosquitoes should also be included in sanitary standards for family premises. It is not the simple matter that one accustomed to modern conveniences might think to bring this degree of sanitation about. Tenants can be quite uninterested in refining property that belongs to another. Owners can, and often do, disclaim all responsibility for premises which they do not themselves occupy; and whether tenant or owner, many a person lives in contented unawareness of the relationship between disease and his mode of living. Then, too, a preventive measure does not exert the same appeal as does one of active defence. The sanitation officer cannot with certainty predict, "That well water is going bad some day unless you move the privy, and you will all be sick." The most he can safely say is, "You might be sick", and the remote

possibility of illness can be as impotent as the remote possibility of war in inducing some individuals to change a situation.

Added to these obstacles set up by the vagaries of human nature is the natural limitation to which one sanitation officer is subject in serving a population of 34,000 persons in a rural territory, the remoter sections of which are 35 to 45 miles from his headquarters.

The sanitation on most of the surveyed premises depends upon the disposition and means of each householder. Of the total in the sample, 112 are included in municipal sewerage systems. Another 33 householders have installed flush toilets with some method of private disposal. On 42 premises there is no device at all for the disposal of excreta, and these probably represent 42 of the most difficult situations with which the sanitation officer has to deal. Efforts to talk the responsible person, or the persons directly concerned, into making a change can be time-consuming, and often the officer will have little in the way of results to show for his pains. Health department records show that such premises receive more visits than those with some means for the disposal of excreta.

As might be expected, the economic gap between the white and colored races is here revealed; the municipal sewerage facilities and the private disposal methods being found mainly on the premises of white families. The lack of satisfactory arrangements is most frequent among the Negroes. In fairness, however, it must be stressed that these are generalities; some Negro householders have installed septic tanks, and some white families are apparently unconcerned about the whole matter of sanitation.

Privies are the most common device for the disposal of excreta met with among the sample of family premises. The suitability of these devices may be inferred from the data given in an analysis (*1*) of the activities of the sanitation officer for these two counties. It is said in that analysis that he found about 75 percent of the privies unsatisfactory on his first visit. This includes privies that never had been satisfactory, and those that may have been so once but had deteriorated under time, the weather, and use. Where the repairs were minor, according to this account of his work, he often made them himself; in fact, he repaired about 18 percent of the total number of insanitary privies inspected by him during the period of time under review in that paper. On another 12 percent of the premises on which stood insanitary privies, he managed to induce the occupants to make repairs. Behind this 12 percent there are a series of revisits by the sanitation officer—1 revisit to two-thirds of the premises, and as many as 6 to some of the others. His most frequent recommendation, it seems, was for a new privy. The next most frequent recommendation was for repairs to the riser, or seat box.

According to the collective memory of the family informants, the sanitation officer visited during the study year—

12 (about 29 percent) of the premises with no means for excreta disposal;
11 (about 33 percent) of the premises with septic tanks or other system of private disposal;
165 (about 42 percent) of the white family premises with privies; and
228 (about 51 percent) of the Negro family premises with privies.

This summary takes no account of revisits, nor of recommendations made and improvements brought about. It simply establishes the number of premises that were recollected as visited by the sanitation officer during this year which the study covered. Premises connected with municipal sewerage systems, of course, would not normally be in line for a visit from him.

As to the sources of water, aside from city water, there are 177 springs and 685 wells among these premises. The springs may be considered questionable sources of drinking water until proved otherwise. The survey workers recorded that 83 of the 177 springs were on a slope below the privy—a perfect setting for a stray case of intestinal infection to spread and make a showing.

Information on the details of the 685 wells is not complete. The investigators reported 34 wells as being on a slope below the privy. A certain percentage they reported as having no earth protection against pollution, or as having loose casings, but the conditions were not clearly described on the whole. Such information as was recorded would indicate that many of these wells are in need of improvement.

Complete screening of the houses, according to the data, is not at all extensive. Less than one-fifth of the houses were recorded as fly proof. About one-fourth had no screens at all. Some screening was found on the remaining dwellings, although not sufficient to afford full protection against flies and mosquitoes.

It cannot be said that the water supply and the screening on these premises where visits by the sanitation officer were reported were actually reached by the sanitation program. They came within the frame of this program, but were not touched to any great extent thereby.

In summary of the reported activities of the sanitation officer within the sample of families, an analysis of the inspected premises indicates that he distributes his activities quite evenly between town and open country homes, between poor families and those that are better off, and between the white and colored races. In the towns and villages a somewhat higher percentage of premises visited was recorded among the Negro families. This perhaps reflects the concentration of colored families in the unsewered sections of town, and the attempt of the sanitation officer to spend the greatest amount of effort where the need is greatest.

The report for the sample of families shows the sanitation officer as reaching within the study year about 46 percent of those premises not coming within a municipal sewerage system. The analysis of his activities (*1*) to which reference has previously been made indicates that, by dint of making repairs himself, and of revisiting those premises where he has left recommendations, he manages to transfer about 30 percent of the privies which he has found upon inspection to be insanitary to the approvable class.

THE ILLNESS PROBLEM

A total of 5,630 individuals make up the 1,009 households selected for study. They include persons of all ages—infants, children, mature persons, and old men and women. About 55 percent are Negroes.

It is proposed to show herein the extent to which illness reached into the ranks of these individuals over a period of 12 months, and the amount of medical care that was reported. It is believed that many of those homes in which there were ill persons who had no medical care represent situations in which a society holding itself responsible for the health and welfare of the underprivileged would recognize a challenge and a reproach. The emphasis of the discussion will be upon those in poor or very poor circumstances, since unfortunate illness situations flourish the more profusely among those who are short on material possessions.

Illness being a variable term, it was necessary to establish a boundary that would divide those indispositions which were to be considered illnesses from those that were not. All communicable or reportable conditions were put in the illness class. Other conditions were judged by reason of the limitations they placed upon the sick person, or by the factor of medical or nursing attendance. If a malady kept a person in bed for 1 day or more, if it kept him from school or work 3 days or more, if it engaged the attention of a physician, the health officer, public health nurse, or some other attendant, it was considered an illness. An immunization was regarded as an illness only if it brought in its train any of the conditions mentioned. Two illness states occurring simultaneously or consecutively with no interval between were considered as a single illness.

This classification of illness is essentially the same as that followed in the Hagerstown studies (*2*) and in the survey conducted by the Committee on the Costs of Medical Care (*3*).

The total illness rate set by the data under review is 640 per 1,000 persons, rather lower than the rates of 1,080 and 850, respectively, established by the other two surveys. The difference is due in part to the unusual prevalence of influenza and other respiratory infections during the course of the two studies referred to, and in part to the larger number of slight colds and other minor conditions that

would be collected by the several spaced calls made by their investigators, as against the one-call method followed in the present studies.

Eliminate the respiratory group of illnesses and the rate becomes 424 for the Hagerstown studies, 502 for the survey conducted by the Committee on the Costs of Medical Care, and 498 for the data herein discussed. It will be seen, therefore, that these data are comparable to those evolved through studies of a like nature.

They reveal, first of all, that about 54 percent of the 5,630 individuals were not ill during the 12-month study period. Another 34 percent were ill but once, and around 11 percent more than once. The white people and the Negroes are about equally represented in each of these divisions. The difference between the total illness rate of 654 for the white and that of 628 for the colored individuals, as established by these data, is probably the result of chance variation and of poorer reporting among the colored.

Table 1 shows the distribution of illness by broad diagnostic groups and according to race. The respiratory group of diseases is seen in its accustomed highest position both as a bed and a nonbed illness. The disorders of the digestive system rank second highest. About half of the digestive disorders become bed illnesses. The third in order of importance by extent is the group of epidemic, endemic, and infectious diseases. Of these about 55 percent become bed illnesses. That group of indispositions attendant upon the puerperal state shows, as might be expected, the highest proportion of bed illness to total illness.

TABLE 1.—*Distribution of total illness and bed illness by broad diagnostic groups and according to color*

Diagnostic group	White			Colored		
	Total cases	Bed cases	Percent bed cases	Total cases	Bed cases	Percent bed cases
All causes	1,603	770	48.0	1,746	823	47.1
Respiratory diseases	392	244	62.2	352	239	67.9
Epidemic, endemic, and infectious diseases	181	108	59.7	173	87	50.3
Other general diseases	89	27	30.3	118	34	28.8
Diseases of nervous system	66	31	47.0	35	17	48.6
Diseases of eyes and ears	36	8	22.2	17	3	17.6
Diseases of circulatory system	63	22	34.9	68	31	45.6
Diseases of teeth and gums	42	7	16.7	49	21	42.9
Diseases of digestive system	233	104	44.6	193	101	52.3
Diseases of kidneys and urinary system	61	22	36.1	50	18	36.0
Nonvenereal diseases of genital organs and annexa	68	37	54.4	72	38	52.8
Puerperal state	80	73	91.2	114	105	92.1
Diseases of skin and cellular tissue	64	9	14.1	191	12	6.3
Accidents and other external causes	85	37	43.5	68	32	47.1
Diseases of bones, congenital malformations, other and ill-defined diseases	143	41	28.7	246	85	34.6
Total years of life		2,451			2,781	

The number of cases of illness in the different diagnostic groups is not large enough to permit minute analysis of seeming distinctions between the two races, but the data do indicate certain variations.

Nervous and digestive disorders appear to be more prevalent among the white people. Those vague ills that can be listed only as ill-defined, however, are reported much more frequently among the colored. Diseases of the skin and cellular tissue were reported about three times as much by the colored as by the white—a total of 191 such illnesses being recorded for the Negroes. Teeth and gum conditions, while reported to about the same extent by both races, were said to cause bed illnesses in about 43 percent of the cases among the colored, whereas about 17 percent were so reported among the white. This fact might point to extreme neglect of the teeth among the colored, due undoubtedly to economic circumstances; it probably means also that when trouble does develop the proper treatment is not given and actual illness is frequently the result of this neglect.

In table 2 it can be seen that the colored families reported less medical attention than did the white. In some groups of diseases, notably conditions resulting from the puerperal state, they reported considerably less. Altogether, about 70 percent of the bed illnesses among the white individuals were reported as having had medical attendance—this might mean one visit from or to a physician, or it might mean several, but at least their condition was observed and diagnosed.

TABLE 2.—*Distribution of bed illnesses by color and percentage attended by a physician* [1]

Diagnostic group	White		Colored		Percent of total bed cases attended
	Bed cases	Percent attended	Bed cases	Percent attended	
All causes	770	69.7	823	51.9	60.5
Respiratory diseases	244	63.1	239	46.9	55.1
Epidemic, endemic, and infectious diseases	108	50.0	87	29.9	41.0
Other general diseases	27	92.6	34	64.7	77.0
Diseases of nervous system	31	80.6	17	47.1	68.8
Diseases of eyes and ears	8	75.0	3	33.3	63.6
Diseases of circulatory system	22	95.5	31	80.6	86.8
Diseases of teeth and gums	7	42.9	21	19.0	25.0
Diseases of digestive system	104	81.7	101	58.4	70.2
Diseases of kidneys and urinary system	22	86.4	18	94.4	90.0
Nonvenereal diseases of genital organs and annexa	37	73.0	38	60.5	66.7
Puerperal state	73	74.0	105	41.9	55.1
Diseases of skin and cellular tissue	9	77.8	12	58.3	66.7
Accidents and other external causes	37	91.9	32	84.4	88.4
Diseases of bones, congenital malformations, other and ill-defined diseases	41	56.1	85	61.2	59.5

[1] Includes dentist. Does not include health officer.

Among the Negroes about 52 percent of the bed illnesses were reported as having been seen by a physician. The gap between the percentage of medical care received by the two races is, it might reasonably be assumed from other circumstances, evidence not of less need but of fewer privileges. It is testimony of the smaller margin of security possessed by the colored, and of the generally poorer circumstances under which they live.

These comparisons of amount of medical attention to amount of illness do not rest upon the premise that all indispositions classified as illness require medical treatment. However proper that may be theoretically, it does not fit the actualities of life in this region; and to talk within those actualities, one must make allowance for the common presumption that the person abed because of a cold, or perhaps the recurrence of some chronic condition, may be doing all that is reasonably necessary by staying in bed.

Still, the number of days in bed induced by the illnesses among these families points to a certain seriousness. About 28 percent of those illnesses which sent the patient to bed sent him there for 1 or 2 days, and another 42 percent occasioned a stay of from 3 to 8 days in bed. These percentages do not vary greatly between the races. Among the white families about 12 percent and among the colored about 15 percent of the illnesses caused 18 days or more in bed. This general effect of seriousness is further deepened by the extension of these disabling illnesses through all ranks. They put the poor and the very poor to bed for stretches of time, as well as those better able financially to give up their activities and responsibilities.

It will be observed from table 2 that diseases of the kidneys and those of the circulatory system were reported as receiving a high measure of medical care. This might be expected, since the definite naming of the diseases in these groups—diseases involving symptoms not usually known to the lay mind—implies diagnosis by a physician. Quite likely there are other cases of such illnesses, reported perhaps under some vague name, which have not been seen by a physician and are therefore not known to the persons sick with them.

It is the negative, however, rather than the positive side of the picture that is most to the point in a consideration of the illness problems of a people. How many of the sick do not have medical attention? And why do they go without it? Is there any provision for treatment of those who are financially unable to provide it for themselves? According to the Committee on the Costs of Medical Care (*4*), there are many families even in the steady income class that are unable to meet the physician's and hospital bills brought about by serious illness. In a group of families such as make up the sample under discussion, one would expect to find a fairly high percentage of illness for which no medical attention was had. The extreme poverty alone would guarantee that. The rural location of so many of the premises also influences the degree to which physicians are consulted.

At all events, among this sample of families some 40 percent of the bed illnesses occurring during the study year were reported as unattended by a physician. It may be taken for granted that many of these illnesses which had no medical treatment represent an inability to meet the needs of the sick, if from no other reasoning than

that so many of them were found in the ranks of the poor. In point of fact, 114 cases of illness, according to the informants, did not have medical treatment for the reason that the families were too poor to afford it. Other reasons given for having no physician involved objection to medical treatment or indifference to the necessities of the case. In all likelihood, these reasons of indifference or animosity or lack of money operated in more cases than were reported.

The epidemic, endemic, and infectious diseases show the largest percentage of bed illnesses unattended by a physician—about 59 percent. This is in line with the practice followed in many a home. If a child catches measles or mumps, or any one of those diseases commonly accepted by parents as part of the routine of childhood, but not considered dangerous, the mother may see to it that he stays in bed and is kept warm and comfortable. Whether she calls a physician depends to some extent on the family income and to some on the course of the disease. The necessity for medical care is more generally recognized when the disease appears to be scarlet fever or diphtheria. All the cases of these two diseases reported by the survey families were also reported as having been seen by a physician, though this might mean little more than that the only cases recognized as scarlet fever and diphtheria were those that were seen by a physician and diagnosed. There might have been others, unseen and undiagnosed, perhaps suspected and perhaps not. One mother reported that her child had been ill in bed from a sore throat, that it "looked like it might be diphtheria", but they did not call a physician; they were too poor.

The judgment of the parent as to the nature of the disease, and the condition of the patient might be offered as the prime factor in determining the demand for medical attention in this group of diseases. Examination of the data reveals that economic circumstances, as might be expected, apparently help to decide whether medical care should be had. Among those families considered in moderate or comfortable circumstances, about 50 percent of these bed illnesses were seen by a physician; among the poor and very poor, about 30 percent. Those who lived in isolated homes reported a smaller percentage of medical care than those in towns and villages—a difference resulting in part from the difficulty of getting the patient to a physician, or perhaps the absence of a telephone, or it might be the inability to meet the increased cost of a home visit. White families reported about 20 percent more medical care than did the colored.

About 16 percent of the bed illnesses occurring through the epidemic, endemic, and infectious diseases were said to have come to the attention of the health department—most of this percentage being made up of the scarlet fever and diphtheria cases. According to the

laws of this State, physicians must report communicable diseases to the health department, and thus it happens that the more serious diseases come to the notice of the health department, while the minor communicable illnesses may run their course without any medical attention. Aside from scarlet fever and diphtheria, only about 8 percent of the illnesses included in the general category of epidemic, endemic, and infectious diseases were reported as having come to the attention of the health department.

The respiratory infections offer another large group of bed illness unattended by a physician. This group includes grippe, bronchitis, head colds, sore throat—all those respiratory conditions in which the patient is likely to judge the severity of his own case and decide whether or not he needs the ministrations of a physician. The more serious types of such conditions, the pneumonias and tuberculosis, were all reported as receiving medical attention; but here again such a report may mean only that the reported number of such diseases were disclosed through diagnosis. It takes no account of those which may exist but have not been diagnosed. Among the more loosely termed conditions in this group there may lurk the beginnings of serious illnesses all unsuspected by the persons entertaining them; or perhaps they are suspected, but ignored.

About 7½ percent of the bed illnesses in the respiratory group were reported as having been in contact with the health department. Most of the patients making up this 7½ percent were incapacitated through tonsil and adenoid conditions.

The tuberculosis cases reported among these surveyed families are too few in number to yield a comprehensive view of the health department program for the control of this disease. Five of the 10 cases recorded among the Negroes were said to have been in contact with the health department. The one case recorded among the white people had been seen at the health department clinic. When the poverty so prevalent in this region is taken into consideration, the overcrowded conditions under which many of the families live, and the generally high incidence of tuberculosis wherever there is a large Negro population, one may reasonably suspect other cases of tuberculosis than were reported. More precisely, according to an analysis of the activities of this health department in controlling this disease "* * * one would be conservative in stating that there are in the two counties not less than 150 active cases of tuberculosis which should have been known to the health authorities" *(5)*. Inasmuch as the 5,630 individuals making up the sample represent about a 16 percent cross section of the population of the two counties, they probably harbor, according to the above opinion, about 24 active cases of tuberculosis.

The puerperal state shows about 45 percent of bed illnesses that were not seen by a physician. Here midwives took care of the cases.

Midwives were reported for about 66 percent of the conditions resulting from the puerperal state. The overlapping between medical care and care by a midwife may be attributed to those cases that proved too difficult for the midwife to handle, or perhaps to certain cases in which a physician was called only for the delivery.

The data reveal that midwives served both white individuals and Negroes, those with some means and those who were poor. The midwife attended the poor and very poor to about twice the extent that she did those in better circumstances. Colored families reported a midwife in about 80 percent of cases, and the white in about 45 percent. In the open country she attended about 72 percent of the cases and in the towns and villages about half.

Less than a fifth of the total puerperal conditions for the year were reported as having come to the attention of the public health nurse or the health officer. Where contact with the health department was reported, it may include ante-partum or post-partum care or both, advice to the mother on diet and hygiene for herself and the infant, on preparation of the layette, and other such considerations. Sometimes the nurse arranged for material relief to be given in maternity cases.

An analysis of the nursing service (*6*) shows that knowledge of maternity cases came to the nurses through the following sources: Midwives, the patients or their relatives, neighbors, chance (where the nurse discovers the case while visiting some other member of the family), and through private physicians. Other cases were reported by the poormaster, school teachers, practical nurses, and others.

Diseases of the eyes, the ears, the skin, and the teeth show about 53 percent of bed illnesses not attended by a physician. The number of bed illnesses within these groups, however, is too small to admit of analysis. It so happens that the few such illnesses from eye or ear troubles reported among those families with some means were all attended by a physician, while those other few reported among the poor all went unattended.

The unattended bed illnesses from diseases of the teeth and gums were recorded principally among the colored, particularly the colored families living away from the towns and villages. Almost invariably they were poor. The data, meager though they are on bed illnesses resulting from teeth conditions, do indicate definitely that for the most part they are illnesses of neglect.

No contact with the health department was reported for any bed illnesses caused by diseases of the eyes, the ears, the skin, and the teeth.

The remaining broad categories of diseases show areas of unattended bed illnesses varying from 10 to 15 percent for diseases of the kidneys, of the circulatory system, and for accidents; over 20 percent for rheumatism and certain general diseases; over 30 percent for diges-

tive and nervous disorders, diseases of the skin, and nonvenereal diseases of the genitals; and over 40 percent for the group of ill-defined diseases. Included in the latter group are a few cases of diseases of the bones and congenital malformations.

The unattended illnesses within these several groups may be divided for explanatory purposes as follows:

1. The vaguer ills of mankind. These are the nervousness, the upset stomach, the indefinite malaise or the itinerant pain, that may be loosely diagnosed without benefit of medical advice.
2. Ailments which are in reality the beginnings of serious conditions which go undiagnosed and undetected because they are not brought to the attention of a physician.
3. Chronic illnesses which have been diagnosed but are not seen by a physician in their subsequent attacks.

Where specific diseases are named, medical attention is usually reported also. Thus, the instances of cerebral hemorrhage, diseases of the heart, ulcers of the stomach, appendicitis, and so on are for the most part reported as having had medical treatment. The reports would indicate, however, that certain of these diseases may be diagnosed but thereafter neglected, even though they attack the patient severely and cause him to remain in bed. As usual, it is particularly among the colored, the poor, and those who live in inaccessible places that such attacks must be endured without the alleviations that medical treatment might bring. The rheumatic diseases furnish a case in point. The 16 bed illnesses occasioned by rheumatism among the white families were all reported as receiving medical attention, but only 15 of the 25 such illnesses among the colored were reported as attended. Those not having a physician were found to be chiefly among the colored poor living in isolated homes.

A scattering of these diseases was reported as having had contact with the health department. They include rheumatism, epilepsy, biliousness, appendicitis, here a case among the rural colored, there one among the village white, and so on. They are too few in number to be susceptible of analysis. The contact is likely to have been of a casual type, since actual care of such patients was not encompassed by the programs.

In support and illustration of the foregoing assumptions of human distress and need, one of the colored families of the 1,009 contributing data to this survey might be presented.

There are 8 persons in this family, and they live in a small and old country cabin of 3 rooms. The father raises corn and tobacco on a share-the-crop basis and, as might be surmised, the whole family lives considerably below the level of comfort. They keep some poultry, one hog, but no cows, and, according to the informant, have

no milk in their diet at all, though 6 members of the household are growing children.

All of the family, except an infant, were reported as suffering and having suffered for a year from an eruption which begins with tiny pustules that burst and form a scab. The mother, who gave the interview, said that the oldest child had been seen by a physician for this condition, but the others had not, as they could not afford it. She said that they used sulphur-and-lard ointment.

The mother said that she herself had suffered from headaches and constipation for several years, and from an almost constant pain in her right side, which she feared signified appendicitis. She said that she had had no medical diagnosis and for lack of money could not go to a physician.

A boy of 13 was in bed for 3 weeks during the study year, unable to use his legs. The mother said that he does not have full and unhampered use of his legs at any time, and was told by a physician some 10 years before that he would always have trouble in this respect. He does not have medical treatment—again, no money.

During the study year, the mother said, a child of 7 was ill in bed for 3 days with a tonsil condition, and one of 5 for 3 days with sore throat and fever. In neither case was any outside medical or nursing help received.

Barring a miracle, there would be no chance of this family's lifting itself out of this slough of sickness and general misery without outside and gratuitous help.

A white rural family reported much the same distressful circumstances. The mother said that she was pregnant, had been in bed for 10 days from a combination of sick headache, kidney trouble, and grippe, but did not have a physician because they had no money and hated to ask for credit. She added that she did not know what she would do when the time for confinement came, that she knew of no midwife in the neighborhood in whom she had confidence, that they had no telephone, and the nearest doctor lived some miles away.

There are 8 persons in this family. The school authorities reported to the parents that two of the children were underweight, and that their teeth and tonsils needed attention. In the midst of such pressing poverty, however, and the extremity in which the mother finds herself, it is ludicrous to exhort these parents to have their children's teeth filled and their tonsils removed, and to provide them with more nourishing food so that they may gain weight.

Neither of these families reported contact with the health department, except for the inspection of the premises of the white family by the sanitation officer. The two mothers, white and black, apparently had no expectation of help in the illnesses of their children

or of themselves, nor any idea of where such help might be found, or how it was possible to secure it.

The tenor of all the foregoing indicates the need for medical care through a fairly widespread section of the population. It shows that poverty, indifference or ignorance, and inaccessibility to medical facilities—sometimes all of them together—operate to let the sick go on being ill until they get well, or go on to more serious illnesses, or perhaps to a state of chronic invalidism. Women approach delivery without knowing how they are going to be taken care of. Children with conditions symptomatic at least of the more dangerous infectious diseases go undiagnosed and untreated except by home remedies.

Such circumstances were accepted with equanimity and resignation years ago, but are out of place in a society that professes to believe that the benefits of science belong to mankind regardless of his worldly state.

THE HEALTH PROGRAM

The foregoing commentary on the insufficiency of the public health program in meeting situations that call for medical treatment is by no means offered as an evaluation of the activities of the health department. These activities cannot be tested by an objective which they are not set up to reach. The personnel of the health department are engaged in carrying on a number of programs for the furtherance of health and the prevention of illness. As mentioned in the beginning of this discussion, this work is largely educational and regulatory in nature. That some agency does not provide medical care in any appreciable degree for the low-income group may be regrettable, since a survey through a fraction of the population discloses an acute need for such service; but this fact does not detract from the essential worth of the programs that are being carried out by the health department.

In point of fact, the department rendered during the course of the study year a considerable series of services to the families included in this survey. The sanitation officer, it will be remembered, reached about 46 percent of those premises not connected with the municipal sewerage systems. Sixty-two of the family informants (about 6 percent) reported that one or more members of the household had visited the cooperative clinic during the study year. By cooperative clinic is meant—

> The several tuberculosis clinics held during the year by a clinician from the State health department;
>
> The orthopedic clinic, sponsored by a local club, held monthly in each county; and
>
> The tonsillectomy clinic held at intervals.

Contacts reported with the health officer or the public health nurse represent for the most part personal services to individuals. Of the total 5,630 individuals, the following received such personal services:

1,116 received physical examinations or inspections;

571 received immunizations;

208 received services in the home or at the office of the health department.

The first item refers mainly to school inspections of pupils for physical defects or for symptoms of communicable diseases. They are made by the nurses usually, though in one of the larger schools the health officer and the nurse acted jointly. The 1,116 inspections reported means that about 75 percent of the individuals of school age were reached by this program during the course of the study year.

The prevention of diphtheria constitutes the major part of the immunization work. The health officer devotes much of his time to the Schick testing carried on in the schools, and the 571 immunizations reported are mainly such school services. However, smallpox, typhoid, and diphtheria immunizations are also given at the offices of the health department on Saturday morning, and these contribute to this total.

Other measures for the control of communicable disease are not fully brought out by the family data, but they may appropriately be alluded to here. The health officer is responsible for carrying out quarantine regulations. Placarding of premises is required for poliomyelitis, diphtheria, meningococcus meningitis, scarlet fever, and smallpox. It is the stated policy of the health officer to visit all cases of typhoid fever, diphtheria, scarlet fever, measles, meningitis, and poliomyelitis which come to his attention, according to an analysis of the communicable disease program previously published (7). It is stated in that paper that most of the cases visited by the health officer or public health nurse were patients attended by a physician. The family calls a physician who reports the disease to the health officer, and he in turn comes to visit the patient and placard the premises. Thus, those families that do not engage a physician are likely to be left out of the picture—not always, but undoubtedly to a great extent.

The 208 individuals listed as receiving home or office services are, for the most part, persons seen by the nurse in the home, or possibly by the health officer. A few were seen at the office of the health department. Some of them were bed patients, and the services to them have already been included in the discussion on illness and medical care. They were, to revert briefly, mainly in the group of epidemic, endemic, and infectious diseases, the respiratory infections, and the puerperal conditions. The other individuals making up the

208 were either ill without being sick in bed, or simply in line for a health supervisory or some other type of health department service.

It might be appropriate here to summarize those programs carried out, in part at least, through the home visits of nurses. The maternity and infancy program, according to an analysis (*8*) of the nurses' activities, accounts for about 40 percent of their first visits to homes. The tuberculosis program accounts for another 16 percent of first visits, and the supervision of those with chronic disease for about 20 percent. Control of communicable disease and general health supervision account for smaller percentages.

The program for maternity and infant supervision, as heretofore mentioned, consists of ante-partum and post-partum advice, preparations for delivery, for the layette, and the like.

The tuberculosis control measures are not well delineated by the data given by this sample of individuals, owing, perhaps, to the small numbers involved and the normal chance of their being missed. An analysis of the whole program has already been published (*5*). It is emphasized therein that the purpose of this tuberculosis program is to discover the individuals who are possibly or manifestly tuberculous and refer them to their family physicians, once the diagnosis has been established. Certain conditions are mentioned as working against an effective program—the poor and insanitary circumstances under which many of the families live; the insufficient bed capacity of the State sanatoria to which the local department must look for hospitalization of the tuberculous; and the charge made by these sanatoria for each patient.

Advice on diet and hygiene are the staples in the nurse's services where she encounters chronic illnesses, communicable diseases, and other conditions that call for health supervision.

The nurses are handicapped in meeting many of the situations because of the insufficiency of the programs, meritorious though the programs may be within their limited range. If the nurse calls upon the mother of a puny infant and through friendly advice induces her to change the child's diet, she is applying a program that fits the case. If the father in that home, however, is ill of diabetes and has no money for medical treatment, the nurse may advise him regarding diet and hygiene, but with no program of medical care she cannot do much to help the man. The health supervisory program here uncovers a situation which it cannot handle. The many such circumstances indicated by the data point the way for the enrichment of health programs.

It should be emphasized that all these data are based on reports of family informants. These informants were obliged to look backward over the events of the study year in order to answer the queries of the survey workers. Without a doubt the passing of upwards of 365 days had buried the memory of many of the health department

services. Then, too, the school children do not always report at home that the nurse or the health officer inspected them at school. The data, however, do reflect the general tenor of the health department programs, and it is believed that they indicate with a fair degree of accuracy the relationship of the health department to a representative fraction of the population within its field of endeavor.

SUMMARY

The foregoing study of the relationship of a rural health program to needs in the area is based upon interviews with a sample of families. This sample was taken from two similar rural southern counties which have combined to form a single health district. The families making up the sample were so chosen that they may be considered a representative fraction of the population. Relatively few of the people in these two counties have any measure of security, and about half of the families selected for study appear to live along or below the subsistence level. The data brought to light a profusion of those social ills which are followers of poverty, such as unsanitary premises, overcrowded living quarters, undernourishment, and illness without proper care.

As a measure of attack against some of the unfortunate conditions inherent in this section of life, the health department carries out a sanitation program concentrated on improving the means for excreta disposal. This program is directed toward that majority of premises not connected with any public sewerage system. Among the sample of families, according to the answers of the informants, this program reached during the study year about 46 percent of those premises that have privies or some other private means for the disposal of excreta, or no means at all.

The other part of the health department program is concerned with personal health. It emphasizes advice in matters of healthful living, advice directed particularly to mothers and children. Diagnostic aid is offered only in reference to tuberculosis and certain physical conditions among children.

In the area of neglected and partially attended illness occur most of the health problems for which the community makes little or no provision of an organized sort. Briefly, the situation is this: Much sickness and distress take their way among this fraction of the population and little is done to check them, for the reason that the patients are too poor to command medical treatment for themselves and society does not provide it for them. This gap in the provision for general welfare aggravates many ills and allows remediable physical defects to continue on to eventual disability.

It would appear from the study that health department programs are developed on the assumption that the people require most of all to be told what is necessary for health. The programs are not designed to cope with those barriers that may so effectually prevent a people from obtaining those things which they need.

REFERENCES

(1) Dean, J. O., and Mountin, Joseph W.: Job analysis of a rural sanitation officer. Pub. Health Rep., **49:** 1529 (Dec. 21, 1934). (Reprint No. 1663.)
(2) Sydenstricker, Edgar: A study of illness in a general population. Hagerstown morbidity studies no. 1. Pub. Health Rep., **41:** 2069 (Sept. 24, 1926). (Reprint No. 1113.)
(3) Collins, Selwyn D.: Causes of illness in 9,000 families based on nation-wide periodic canvasses, 1928–31. Pub. Health Rep., **48:** 283 (Mar. 24, 1933). (Reprint No. 1563.)
(4) Falk, I. S., Rorem, C. Rufus, and Ring, Martha D.: The costs of medical care. Publications of the Committee on the Costs of Medical Care: No. 27. University of Chicago Press. 1933.
(5) Dean, J. O.: Tuberculosis control by a small county health department. Pub. Health Rep., **52:** 597 (May 7, 1937). (Reprint No. 1822.)
(6) McIver, Pearl: The maternity nursing service of a bicounty health department. Pub. Health Rep., **50:** 1293 (Sept. 20, 1935). (Reprint No. 1703.)
(7) Dean, J. O., and Pennell, Elliott H.: Communicable diseases and activities for their control in the Brunswick-Greensville area. Pub. Health Rep., **51:** 991 (July 24, 1936). (Reprint No. 1761.)
(8) McIver, Pearl: Public health nursing in a bi-county health department. Pub. Health Rep., **50:** 469 (Apr. 5, 1935). (Reprint No. 1679.)

DEATHS DURING WEEK ENDED AUGUST 21, 1937

[From the Weekly Health Index, issued by the Bureau of the Census, Department of Commerce]

	Week ended Aug. 21, 1937	Corresponding week, 1936
Data from 86 large cities in the United States:		
Total deaths	7,421	7,368
Average for 3 prior years	7,109	
Total deaths, first 33 weeks of year	294,877	295,589
Deaths under 1 year of age	538	470
Average for 3 prior years	518	
Deaths under 1 year of age, first 33 weeks of year	18,853	18,565
Data from industrial insurance companies:		
Policies in force	69,683,606	68,265,792
Number of death claims	10,988	11,329
Death claims per 1,000 policies in force, annual rate	8.2	8.7
Death claims per 1,000 policies, first 33 weeks of year, annual rate	10.2	10.3

PREVALENCE OF DISEASE

No health department, State or local, can effectively prevent or control disease without knowledge of when, where, and under what conditions cases are occurring

UNITED STATES

CURRENT WEEKLY STATE REPORTS

These reports are preliminary, and the figures are subject to change when later returns are received by the State health officers

Cases of certain communicable diseases reported by telegraph by State health officers for weeks ended Aug. 28, 1937, and Aug. 29, 1936

Division and State	Diphtheria		Influenza		Measles		Meningococcus meningitis	
	Week ended Aug. 28, 1937	Week ended Aug. 29, 1936	Week ended Aug. 28, 1937	Week ended Aug. 29, 1936	Week ended Aug. 28, 1937	Week ended Aug. 29, 1936	Week ended Aug. 28, 1937	Week ended Aug. 29, 1936
New England States:								
Maine	----	1	----	1	7	21	0	0
New Hampshire	----	----	----	----	4	----	0	0
Vermont	----	1	----	----	----	----	0	0
Massachusetts	----	3	----	----	10	27	3	1
Rhode Island	----	----	----	----	5	1	0	0
Connecticut	1	1	----	1	8	3	1	1
Middle Atlantic States:								
New York	11	12	[1] 2	[1] 2	84	75	8	9
New Jersey	6	6	6	6	37	26	2	2
Pennsylvania	22	17	----	----	129	47	2	4
East North Central States:								
Ohio	14	17	4	8	93	13	3	1
Indiana	7	5	4	4	5	3	0	2
Illinois	15	25	5	2	51	11	4	2
Michigan	5	3	----	----	24	14	2	3
Wisconsin	----	----	28	12	21	16	1	1
West North Central States:								
Minnesota	1	2	----	3	2	4	1	0
Iowa [1]	----	5	2	1	3	----	1	1
Missouri	6	10	7	9	18	----	1	2
North Dakota	2	4	----	1	----	1	0	0
South Dakota	----	----	----	----	1	1	1	1
Nebraska	----	5	----	----	3	3	0	0
Kansas	2	5	1	----	6	2	0	0
South Atlantic States:								
Delaware [1]	----	----	----	----	----	----	0	0
Maryland [1] [4]	3	3	2	----	11	6	0	3
District of Columbia	4	----	----	----	3	4	5	1
Virginia [1]	21	22	----	----	16	16	4	2
West Virginia	10	11	15	9	4	2	2	1
North Carolina [1] [3]	34	36	----	5	24	6	1	2
South Carolina [1]	11	4	80	53	5	6	1	1
Georgia [1]	20	12	----	----	----	----	0	1
Florida [1]	6	1	2	1	6	1	0	3
East South Central States:								
Kentucky	15	11	8	12	37	15	1	3
Tennessee	14	17	15	7	14	----	1	2
Alabama [1]	14	26	4	1	5	4	9	2
Mississippi [1] [4]	11	13	----	----	----	----	1	0

See footnotes at end of table.

Cases of certain communicable diseases reported by telegraph by State health officers for weeks ended Aug. 28, 1937, and Aug. 29, 1936—Continued

Division and State	Diphtheria		Influenza		Measles		Meningococcus meningitis	
	Week ended Aug. 28, 1937	Week ended Aug. 29, 1936	Week ended Aug. 28, 1937	Week ended Aug. 29, 1936	Week ended Aug. 28, 1937	Week ended Aug. 29, 1936	Week ended Aug. 28, 1937	Week ended Aug. 29, 1936
West South Central States:								
Arkansas	15	4	5	3	4	----	0	0
Louisiana [3]	10	9	5	23	1	----	1	2
Oklahoma [3]	4	6	27	8	5	3	0	0
Texas [3]	15	28	37	8	8	18	1	0
Mountain States:								
Montana [3]	2	1	----	----	3	----	0	1
Idaho	3	----	----	----	----	1	0	0
Wyoming	----	----	----	----	1	----	0	0
Colorado	1	3	----	----	16	----	2	0
New Mexico	5	5	----	----	21	1	1	0
Arizona	2	2	11	17	----	16	0	2
Utah [4]	----	1	----	----	15	3	0	0
Pacific States:								
Washington	2	----	----	----	35	4	0	0
Oregon	4	1	8	4	7	4	0	2
California	21	24	11	14	24	43	8	1
Total	339	362	286	215	776	421	63	59
First 34 weeks of year	14,082	15,102	274,785	140,307	241,920	267,760	4,250	5,938

Division and State	Poliomyelitis		Scarlet fever		Smallpox		Typhoid fever	
	Week ended Aug. 28, 1937	Week ended Aug. 29, 1936	Week ended Aug. 28, 1937	Week ended Aug. 29, 1936	Week ended Aug. 28, 1937	Week ended Aug. 29, 1936	Week ended Aug. 28, 1937	Week ended Aug. 29, 1936
New England States:								
Maine	8	1	2	7	0	0	9	3
New Hampshire	5	0	1	----	0	0	3	0
Vermont	5	0	1	4	0	0	0	0
Massachusetts	51	3	20	26	0	0	3	4
Rhode Island	1	0	6	11	0	0	0	0
Connecticut	7	0	7	3	0	0	0	4
Middle Atlantic States:								
New York	64	10	67	83	0	0	17	41
New Jersey	8	2	17	16	0	0	9	11
Pennsylvania	22	6	78	59	0	0	43	24
East North Central States:								
Ohio	50	14	69	69	1	1	72	28
Indiana	7	1	24	11	1	0	7	20
Illinois	46	19	42	82	1	3	20	25
Michigan	31	3	93	51	0	0	15	5
Wisconsin	13	1	19	69	1	0	2	1
West North Central States:								
Minnesota	14	2	20	18	0	0	0	2
Iowa [3]	14	2	15	10	4	2	3	8
Missouri	29	1	30	19	1	2	17	27
North Dakota	0	0	11	3	0	0	3	0
South Dakota	0	0	13	4	0	0	0	0
Nebraska	19	0	3	5	0	1	1	0
Kansas	15	1	18	17	0	1	8	19
South Atlantic States:								
Delaware [3]	1	1	----	----	0	0	1	0
Maryland [3 4]	7	0	7	11	0	0	18	9
District of Columbia	3	1	1	0	0	0	2	0
Virginia [3]	2	5	3	12	0	0	20	19
West Virginia	7	1	29	12	0	0	16	9
North Carolina [3 5]	4	0	15	24	0	0	23	26
South Carolina [3]	1	1	1	----	0	0	8	18
Georgia [3]	4	10	12	10	0	0	20	38
Florida [3]	1	4	----	4	0	0	0	2

See footnotes at end of table.

Cases of certain communicable diseases reported by telegraph by State health officers for weeks ended Aug. 28, 1937, and Aug. 29, 1936—Continued

Division and State	Poliomyelitis		Scarlet fever		Smallpox		Typhoid fever	
	Week ended Aug. 28, 1937	Week ended Aug. 29, 1936	Week ended Aug. 28, 1937	Week ended Aug. 29, 1936	Week ended Aug. 28, 1937	Week ended Aug. 29, 1936	Week ended Aug. 28, 1937	Week ended Aug. 29, 1936
East South Central States:								
Kentucky	4	7	42	13	1	0	49	56
Tennessee	5	19	17	8	0	0	32	33
Alabama [3]	4	16	4	13	18	0	8	36
Mississippi [3] [4]	8	15	2	8	0	0	9	9
West South Central States:								
Arkansas	7	0	11	2	0	0	37	12
Louisiana [3]	4	0	2	7	0	0	23	23
Oklahoma [5]	25	0	12	7	0	0	24	16
Texas [3]	34	1	16	15	0	0	60	43
Mountain States:								
Montana [3]	1	0	6	4	16	8	1	5
Idaho	0	0	3	1	4	0	1	2
Wyoming	10	0	1	4	0	1	0	1
Colorado	28	2	8	6	0	0	9	1
New Mexico	1	1	2	9	0	0	15	13
Arizona	2	0	1	1	0	0	3	4
Utah [4]	1	0	12	10	1	2	2	0
Pacific States:								
Washington	5	2	14	15	12	0	4	3
Oregon	0	0	7	16	8	0	3	2
California	44	12	59	65	3	0	13	12
Total	622	164	843	844	72	21	633	614
First 34 weeks of year	4,054	1,618	165,702	179,559	8,046	5,976	8,818	7,894

[1] New York City only.
[2] Rocky Mountain spotted fever, week ended Aug. 28, 1937, 5 cases, as follows: Iowa, 1; Maryland, 1; Virginia, 1; North Carolina, 1; Montana, 1.
[3] Typhus fever, week ended Aug. 28, 1937, 76 cases, as follows: Delaware, 1; North Carolina, 1; South Carolina, 3; Georgia, 17; Florida, 4; Alabama, 20; Mississippi, 2; Louisiana, 3; Texas, 25.
[4] Week ended earlier than Saturday.
[5] Figures for 1936 are exclusive of Oklahoma City and Tulsa.

SUMMARY OF MONTHLY REPORTS FROM STATES

The following summary of cases reported monthly by States is published weekly and covers only those States from which reports are received during the current week:

State	Meningococcus meningitis	Diphtheria	Influenza	Malaria	Measles	Pellagra	Poliomyelitis	Scarlet fever	Smallpox	Typhoid fever
June 1937										
New Mexico	1	13	4	1	208	2	0	69	2	8
July 1937										
Alabama	21	35	37	832	69	60	9	22	2	61
Arkansas	10	29	20	824	30	80	172	32	0	206
Florida	10	18	1	161	35	10	1	12	0	12
Georgia	3	27	10	723	10	172	16	40	0	199
Kansas	2	13	4	2	31	------	29	124	18	57
Louisiana	5	23	87	184	6	10	27	21	0	99
Maine	1	3	2	------	84	3	11	20	0	7
Mississippi	4	39	716	7,526	345	516	88	14	5	87
Missouri	6	39	144	390	269	5	64	208	26	138
Montana	2	3	2	------	30	------	2	36	53	4
Nevada	2	1	------	------	------	------	0	6	0	0
New Mexico	------	6	6	3	167	3	3	19	------	14
Oklahoma	7	20	32	236	69	40	189	52	8	141
Oregon	1	6	34	7	31	------	1	42	25	11
Rhode Island	3	2	------	------	52	------	0	37	0	0
Texas	12	116	267	2,786	639	184	184	154	------	291

Summary of monthly reports from States—Continued

June 1937

	Cases
New Mexico:	
Chicken pox	45
Dysentery (amoebic)	1
Dysentery (bacillary)	1
Food poisoning	4
German measles	3
Mumps	16
Ophthalmia neonatorum	2
Puerperal septicemia	1
Whooping cough	83
Rhode Island:	
Undulant fever	2

July 1937

	Cases
Actinomycosis:	
Montana	1
Anthrax:	
Louisiana	1
Texas	4
Beriberi:	
Florida	1
Chicken pox:	
Alabama	10
Arkansas	11
Florida	10
Georgia	20
Kansas	19
Maine	89
Mississippi	178
Missouri	54
Montana	51
Nevada	6
New Mexico	7
Oklahoma	16
Oregon	56
Rhode Island	17
Texas	105
Conjunctivitis:	
Georgia (acute infectious)	2
Oklahoma	1
Dengue:	
Florida	1
Texas	20
Dysentery:	
Alabama (amoebic)	3
Arkansas (amoebic)	33
Florida	3
Georgia (amoebic)	11
Georgia (bacillary)	83
Kansas (amoebic)	7
Louisiana (amoebic)	3
Mississippi (amoebic)	134
Mississippi (bacillary)	1,483
Missouri	102
New Mexico (unspecified)	3
New Mexico (amoebic)	2
New Mexico (bacillary)	14
Oklahoma	108
Oregon (amoebic)	3
Texas (amoebic)	5
Texas (bacillary)	636
Encephalitis, epidemic or lethargic:	
Kansas	2
Maine	1
Missouri	2
Montana	1
New Mexico	1
Oklahoma	2

July 1937—Continued

	Cases
German measles:	
Alabama	2
Florida	1
Kansas	14
Maine	13
Montana	3
New Mexico	2
Rhode Island	3
Hook worm disease:	
Florida	899
Georgia	320
Louisiana	17
Mississippi	542
Impetigo contagiosa:	
Montana	7
Oklahoma	1
Oregon	19
Jaundice, infectious:	
Oregon	28
Mumps:	
Alabama	57
Arkansas	28
Florida	18
Georgia	34
Kansas	110
Maine	78
Mississippi	243
Missouri	45
Montana	29
New Mexico	19
Oklahoma	9
Oregon	23
Rhode Island	7
Texas	351
Ophthalmia neonatorum:	
Alabama	2
Mississippi	7
Missouri	1
New Mexico	1
Oklahoma	1
Paratyphoid fever:	
Florida	1
Georgia	3
Kansas	6
Louisiana	1
Texas	23
Puerperal septicemia:	
Georgia	2
Mississippi	23
Rabies in animals:	
Alabama	60
Louisiana	10
Maine	2
Mississippi	30
Missouri	25
Oregon	6
Rhode Island	1
Rabies in man:	
Alabama	1
Florida	3
Mississippi	1
Rocky Mountain spotted fever:	
Arkansas	3
Montana	5
Oregon	6
Rhode Island	2
Scabies:	
Montana	1
Oklahoma	1
Oregon	24
Septic sore throat:	
Georgia	16
Kansas	1
Louisiana	1
Maine	1

July 1937—Continued

	Cases
Septic sore throat—Contd.	
Missouri	43
Montana	6
New Mexico	1
Oklahoma	77
Oregon	4
Rhode Island	5
Tetanus:	
Alabama	8
Florida	1
Georgia	2
Louisiana	3
Missouri	2
Oklahoma	1
Trachoma:	
Georgia	1
Kansas	1
Mississippi	1
Missouri	84
Montana (delayed reports)	53
New Mexico	3
Oklahoma	2
Tularemia:	
Alabama	1
Arkansas	12
Florida	3
Louisiana	4
Missouri	2
Montana	3
Nevada	3
Oregon	2
Texas	6
Typhus fever:	
Alabama	74
Florida	19
Georgia	145
Louisiana	1
Mississippi	5
Texas	56
Undulant fever:	
Alabama	3
Arkansas	6
Florida	1
Georgia	9
Kansas	10
Louisiana	6
Maine	1
Missouri	4
Nevada	1
Oklahoma	45
Oregon	3
Texas	15
Vincent's infection:	
Florida	4
Kansas	4
Maine	7
Oklahoma	4
Oregon	17
Whooping cough:	
Alabama	234
Arkansas	163
Florida	65
Georgia	219
Kansas	386
Louisiana	67
Maine	126
Mississippi	869
Missouri	534
Montana	93
Nevada	2
New Mexico	181
Oklahoma	139
Oregon	152
Rhode Island	101
Texas	1,288

FATAL CASE OF PLAGUE IN FRESNO COUNTY, CALIF.

Dr. W. M. Dickie, Director of Public Health of California, under date of August 30, 1937, reported a fatal case of human plague in Fresno County, Calif.

PLAGUE INFECTION IN FLEAS AND LICE, ORMSBY COUNTY, NEV.

Under date of August 30, 1937, Senior Surgeon C. R. Eskey reported that plague had been demonstrated in a lot of 134 fleas and 4 lice collected from 3 ground squirrels (*Citellus beecheyi*) shot 13 miles west of Carson City, Ormsby County, Nev., on August 20, 1937.

TYPHOID FEVER IN PORTSMOUTH, OHIO, TRACED TO USE OF RAW MILK

According to later information [1] furnished by Dr. J. P. Leake, of the Public Health Service, the outbreak of typhoid fever in Portsmouth, Ohio, has been traced to the use of raw milk. Investigation showed that 61 percent of the cases occurred in persons supplied by a raw-milk dairy which distributed only 1 percent of the milk used in the city. Since the middle of June and up to September 3, there had been 68 cases in the city and 21 in the county outside the city, with 3 deaths.

WEEKLY REPORTS FROM CITIES

City reports for week ended Aug. 21, 1937

This table summarizes the reports received weekly from a selected list of 140 cities for the purpose of showing a cross section of the current urban incidence of the communicable diseases listed in the table. Weekly reports are received from about 700 cities, from which the data are tabulated and filed for reference.

State and city	Diphtheria cases	Influenza		Measles cases	Pneumonia deaths	Scarlet fever cases	Smallpox cases	Tuberculosis deaths	Typhoid fever cases	Whooping cough cases	Deaths, all causes
		Cases	Deaths								
Data for 90 cities:											
5-year average	117	50	13	247	277	270	4	356	110	1,115	------
Current week [1]	83	22	11	304	280	233	6	355	91	1,201	------
Maine:											
Portland	0	------	0	0	0	1	0	0	0	12	20
New Hampshire:											
Concord	0	------	0	0	3	0	0	0	0	0	17
Manchester	0	------	0	0	1	0	0	0	0	0	31
Nashua	0	------	------	0	------	1	0	------	0	5	9
Vermont:											
Barre	0	------	0	0	1	0	0	0	0	0	3
Burlington	0	------	0	0	0	0	0	0	0	0	8
Rutland	0	------	0	0	0	0	0	0	0	0	9
Massachusetts:											
Boston	1	------	1	4	11	10	0	8	1	23	177
Fall River	0	------	0	1	0	0	0	2	0	22	32
Springfield	0	------	0	0	0	0	0	1	0	5	35
Worcester	0	------	0	1	3	3	0	1	0	10	41
Rhode Island:											
Pawtucket	0	------	0	0	0	1	0	0	0	0	20
Providence	0	------	0	0	2	1	0	2	1	14	46
Connecticut:											
Bridgeport	1	------	0	0	2	1	0	0	0	0	33
Hartford	0	------	0	2	2	2	0	1	0	1	36
New Haven	0	1	0	0	0	0	0	1	0	2	28

[1] Figures for Cincinnati and Los Angeles estimated; reports not received.

[1] See Public Health Reports for Sept. 3, 1937, p. 1241.

City reports for week ended Aug. 21, 1937—Continued

State and city	Diphtheria cases	Influenza		Measles cases	Pneumonia deaths	Scarlet fever cases	Smallpox cases	Tuberculosis deaths	Typhoid fever cases	Whooping cough cases	Deaths, all causes
		Cases	Deaths								
New York:											
Buffalo	0	------	0	0	1	5	0	5	0	24	112
New York	17	1	1	72	55	23	1	69	18	105	1,185
Rochester	0	------	0	1	3	1	0	1	0	11	67
Syracuse	0	------	0	1	0	0	0	1	0	19	39
New Jersey:											
Camden	0	------	1	0	1	0	0	1	0	0	30
Newark	0	------	0	0	1	1	0	13	1	17	87
Trenton	0	------	0	2	3	0	0	3	0	0	30
Pennsylvania:											
Philadelphia	0	1	1	3	13	12	0	20	5	41	372
Pittsburgh	4	------	0	16	8	6	0	12	3	47	152
Reading	0	------	0	0	1	0	0	0	0	1	17
Scranton	0	------	--------	0	-------	0	0	-------	0	3	--------
Ohio:											
Cincinnati	-------	------	-------	-------	-------	-------	-------	-------	-------	-------	-------
Cleveland	4	1	0	29	8	13	0	9	8	43	171
Columbus	1	------	0	1	4	1	0	2	5	5	86
Toledo	0	------	0	5	2	2	0	7	8	28	85
Indiana:											
Anderson	0	------	0	1	1	0	0	1	0	0	14
Fort Wayne	0	------	0	0	1	0	0	0	0	0	25
Indianapolis	0	------	0	1	6	0	0	2	1	18	113
Muncie	0	------	0	0	0	0	0	0	0	0	7
South Bend	0	------	0	0	0	0	0	0	0	0	11
Terre Haute	0	------	0	0	0	2	0	0	0	1	15
Illinois:											
Alton	0	------	0	0	0	0	0	0	0	0	5
Chicago	4	4	1	47	24	32	0	39	2	77	699
Elgin	0	------	0	0	0	0	0	0	0	3	10
Moline	0	------	0	0	0	0	0	1	0	6	7
Springfield	0	------	0	0	1	1	0	0	1	1	21
Michigan:											
Detroit	3	------	0	22	8	29	0	15	2	97	243
Flint	-------	0	0	0	1	4	0	0	4	4	28
Grand Rapids	1	------	0	2	1	1	0	0	0	15	26
Wisconsin:											
Kenosha	0	------	0	0	0	1	0	0	0	1	11
Madison	1	------	0	0	0	3	0	0	0	10	16
Milwaukee	0	------	0	27	5	4	0	4	0	43	109
Racine	0	------	0	0	0	0	0	0	0	3	13
Superior	0	------	0	0	0	0	0	0	0	0	7
Minnesota:											
Duluth	1	------	0	0	0	0	0	2	0	4	32
Minneapolis	0	------	0	2	0	11	0	2	1	16	78
St. Paul	0	------	0	0	3	1	0	2	1	35	50
Iowa:											
Cedar Rapids	0	------	--------	1	-------	0	0	-------	0	1	--------
Davenport	0	------	-------	0	-------	0	1	-------	0	0	-------
Des Moines	0	------	-------	0	-------	1	0	-------	0	0	35
Sioux City	0	------	-------	0	-------	5	0	-------	0	2	--------
Waterloo	0	------	-------	1	-------	1	0	-------	0	0	--------
Missouri:											
Kansas City	0	------	0	2	1	4	0	4	0	6	83
St. Joseph	0	------	0	0	1	2	0	0	0	0	25
St. Louis	8	------	0	19	6	15	1	9	6	8	196
North Dakota:											
Fargo	0	------	0	0	1	0	1	0	0	36	13
Grand Forks	0	------	--------	0	-------	0	0	-------	1	0	--------
Minot	1	------	0	0	0	0	0	0	0	0	6
South Dakota:											
Aberdeen	0	------	--------	0	-------	1	0	-------	0	6	--------
Nebraska:											
Omaha	1	------	0	1	2	1	0	1	0	3	42
Kansas:											
Lawrence	0	------	0	1	0	0	0	0	0	2	3
Topeka	0	------	0	1	0	1	0	0	0	13	13
Wichita	0	------	0	0	2	0	0	1	1	2	20
Delaware:											
Wilmington	0	------	0	0	4	0	0	0	0	5	23
Maryland:											
Baltimore	3	------	0	1	6	2	0	12	7	83	195
Cumberland	0	------	0	0	0	0	0	0	0	0	16
Frederick	0	------	0	0	0	0	0	0	0	0	2
Dist. of Col.:											
Washington	3	------	0	5	5	2	0	10	3	1	169

City reports for week ended Aug. 21, 1937—Continued

State and city	Diphtheria cases	Influenza		Measles cases	Pneumonia deaths	Scarlet fever cases	Smallpox cases	Tuberculosis deaths	Typhoid fever cases	Whooping cough cases	Deaths, all causes
		Cases	Deaths								
Virginia:											
Lynchburg	0		0	0	2	0	0	0	1	1	15
Norfolk	0		0	0	1	1	0	0	0	0	21
Richmond	1		0	0	1	0	0	0	0	0	40
Roanoke	1		0	0	0	0	0	0	0	0	7
West Virginia:											
Charleston	1		0	0	2	0	0	0	0	0	16
Huntington	1			0		1	0		0	0	
Wheeling	0		0	1	2	1	0	0	0	10	28
North Carolina:											
Gastonia	0			0		0	0		0	1	
Raleigh	0		0	0	1	0	0	1	0	0	21
Wilmington	0		0	0	0	0	0	0	0	20	13
Winston-Salem	1		0	1	1	2	0	0	1	15	21
South Carolina:											
Charleston	0	1	0	0	2	2	0	1	0	0	20
Florence	0		0	0	1	1	0	1	0	0	19
Greenville	0		1	0	1	0	0	0	0	0	12
Georgia:											
Atlanta	6	1	0	0	4	3	0	8	0	23	78
Brunswick	0		0	0	0	0	0	1	0	4	5
Savannah	1	1	0	0	0	0	0	2	1	4	31
Florida:											
Miami	1		0	7	0	0	0	4	3	2	42
Tampa	1	1	1	2	0	0	0	1	0	0	25
Kentucky:											
Covington	0		0	1	0	1	0	0	0	0	10
Lexington	0		0	0	1	0	0	1	0	7	20
Louisville	0	1	0	11	2	8	0	3	0	32	77
Tennessee:											
Knoxville	0		0	0	1	0	0	0	0	0	23
Memphis	1		2	3	1	0	0	3	1	3	70
Nashville	1		0	1	4	0	0	2	3	13	47
Alabama:											
Birmingham	2		0	0	2	0	0	4	0	0	67
Mobile	1		0	0	0	0	0	1	1	0	18
Montgomery	1	1		0		0	0		0	4	
Arkansas:											
Fort Smith	0			0		2	0		0	0	
Little Rock	0		0	0	1	0	0	1	1	1	3
Louisiana:											
Lake Charles	0		0	0	0	1	0	0	3	0	4
New Orleans	2	1	0	0	9	3	0	16	3	6	130
Shreveport	0		0	0	0	0	0	1	0	0	24
Oklahoma:											
Oklahoma City	0		0	0	2	1	0	1	2	0	38
Texas:											
Dallas	2	1	1	0	1	2	0	1	0	11	61
Fort Worth	0		0	0	0	0	0	0	0	13	26
Galveston	0		0	0	0	0	0	2	0	0	14
Houston	1	5	0	0	2	0	0	4	1	3	92
San Antonio	2		0	1	2	0	0	9	0	0	56
Montana:											
Billings	0		0	0	2	1	0	0	2	0	10
Great Falls	0		0	0	0	1	1	0	0	6	4
Helena	0		0	0	0	3	0	0	0	0	2
Missoula	0		0	0	0	1	0	0	0	0	2
Idaho:											
Boise	0		0	0	2	0	0	0	0	0	8
Colorado:											
Colorado Springs	0		0	3	1	0	0	0	0	2	7
Denver	0		1	4	9	2	0	5	0	9	78
Pueblo	0		0	0	1	1	0	0	1	0	14
New Mexico:											
Albuquerque	0		0	0	1	0	0	3	0	1	17
Utah:											
Salt Lake City	0		0	3	2	3	0	0	0	15	32
Washington:											
Seattle	0		0	5	1	0	0	1	1	18	59
Spokane	0		0	1	2	1	0	0	0	6	15
Tacoma	0		0	0	2	0	0	1	0	2	24
Oregon:											
Portland	0		0	0	2	0	3	3	0	1	67
Salem	0			0		0	0		0	1	
California:											
Los Angeles											
Sacramento	1		0	3	0	1	0	0	0	10	22
San Francisco	0	1	0	3	7	1	0	9	0	36	149

City reports for week ended Aug. 21, 1937—Continued

State and city	Meningococcus meningitis		Poliomyelitis cases
	Cases	Deaths	
Massachusetts:			
Boston	0	1	19
Worcester	1	0	0
Rhode Island:			
Providence	0	0	1
New York:			
Buffalo	0	0	6
New York	5	1	21
New Jersey:			
Newark	0	0	1
Pennsylvania:			
Philadelphia	0	1	5
Pittsburgh	0	0	3
Ohio:			
Cleveland	1	0	10
Columbus	0	0	3
Toledo	0	0	2
Indiana:			
Anderson	1	0	0
Fort Wayne	0	0	1
Indianapolis	0	0	1
Illinois:			
Alton	0	1	0
Chicago	2	2	31
Elgin	0	0	1
Michigan:			
Detroit	1	0	11
Grand Rapids	0	0	1
Wisconsin:			
Kenosha	0	0	1
Milwaukee	0	0	4
Racine	1	1	0
Minnesota:			
Duluth	0	0	1
Minneapolis	0	0	8
St. Paul	1	0	1
Missouri:			
Kansas City	0	0	5
St. Louis	0	0	1
Nebraska:			
Omaha	1	0	13
Kansas:			
Wichita	0	0	1
Maryland:			
Baltimore	2	1	4
District of Columbia:			
Washington	3	0	3
South Carolina:			
Greenville	0	1	0
Georgia:			
Atlanta	0	0	2
Kentucky:			
Lexington	0	0	1
Louisville	1	0	0
Tennessee:			
Memphis	0	0	1
Alabama:			
Birmingham	1	1	0
Mobile	0	0	1
Texas:			
Dallas	0	0	1
Houston	1	1	2
Montana:			
Great Falls	0	0	1
Colorado:			
Denver	0	0	1
Pueblo	1	1	1

Encephalitis, epidemic or lethargic.—Cases: Boston, 1; New York, 1; St. Louis, 13; Atlanta, 1; Houston, 1.
Pellagra.—Cases: Chicago, 1; Charleston, S. C., 1; Atlanta, 2; Savannah, 2; Louisville, 2; New Orleans, 2.
Typhus fever.—Cases: New York, 1; Des Moines, 1; Charleston, S. C., 3; Atlanta, 1; Montgomery, 1; Fort Worth, 1; San Antonio, 1.

FOREIGN AND INSULAR

CANADA

Provinces—Communicable diseases—2 weeks ended August 14, 1937.—During the 2 weeks ended August 14, 1937, cases of certain communicable diseases were reported by the Department of Pensions and National Health of Canada as follows:

Disease	Prince Edward Island	Nova Scotia	New Brunswick	Quebec	Ontario	Manitoba	Saskatchewan	Alberta	British Columbia	Total
Cerebrospinal meningitis	1		1	4					1	7
Chicken pox				43	82	7	34	6	6	178
Diphtheria		1		72	8	6	3	1		91
Dysentery				3						3
Erysipelas		1		3	5	3		1	1	14
Influenza	1				1				15	17
Leprosy			1							1
Measles		8	66	100	294	12	33	45	37	595
Mumps					24	8	1		10	43
Paratyphoid fever					10					10
Pneumonia	7				6		23		12	48
Poliomyelitis		9		12	130	17	3	5		176
Scarlet fever		4	9	79	95	10	24	23	10	254
Trachoma							2		5	7
Tuberculosis	11	28	56	95	44	4	46		33	317
Typhoid fever			1	51	14	1	3	1	1	72
Undulant fever				1			1			2
Whooping cough				231	287	72	43	1	46	680

ITALY

Communicable diseases—4 weeks ended June 20, 1937.—During the 4 weeks ended June 20, 1937, cases of certain communicable diseases were reported in Italy as follows:

Disease	May 24–30		May 31–June 6		June 7–13		June 14–20	
	Cases	Communes affected	Cases	Communes affected	Cases	Communes affected	Cases	Communes affected
Anthrax	16	15	11	10	16	16	27	21
Cerebrospinal meningitis	24	21	25	17	16	15	29	28
Chicken pox	518	208	533	212	467	201	325	162
Diphtheria	407	203	451	221	375	197	357	182
Dysentery	13	11	12	8	26	15	81	11
Hookworm disease	17	10	10	9	22	9	7	6
Lethargic encephalitis	1	1	5	5			2	2
Measles	1,610	379	1,729	392	1,447	353	1,508	352
Mumps	285	114	288	111	272	118	248	101
Paratyphoid fever	33	28	39	36	67	44	67	59
Poliomyelitis	37	28	40	35	41	30	78	54
Puerperal fever	37	35	20	20	30	27	26	24
Rabies	1	1	1	1				
Scarlet fever	365	133	336	120	334	135	267	112
Typhoid fever	257	169	271	159	356	199	379	191
Undulant fever	135	97	158	91	157	94	140	99
Whooping cough	691	188	714	224	722	226	715	211

SWEDEN

Vital statistics—1936.—Following are vital statistics for Sweden for the year 1936:

Number of births	88,672
Births per 1,000 population	14.17
Deaths (estimated)	74,860
Deaths per 1,000 population	11.96
Marriages	53,265

VENEZUELA

Vital statistics—1936.—The following table shows the births and deaths in Venezuela during the year 1936:

	Number	Rate per 1,000 population
Population	3,233,391	
Marriages	10,393	
Births	106,497	32.94
Deaths	57,844	17.89
Maternal deaths	364	[1] 3.41
Deaths from—		
Cancer and other malignant tumors	676	.21
Diarrhea and enteritis (under 2 years)	2,580	[1] 23.97
Dysentery	450	.14
Malaria	2,224	.69
Tetanus, infantile	400	[1] 3.76
Tuberculosis, pulmonary	2,877	.89

[1] Per 1,000 births.

CHOLERA, PLAGUE, SMALLPOX, TYPHUS FEVER, AND YELLOW FEVER

NOTE.—A table giving current information of the world prevalence of quarantinable diseases appeared in the PUBLIC HEALTH REPORTS for Aug. 27, 1937, pp. 1191–1205. A similar cumulative table will appear in the PUBLIC HEALTH REPORTS to be issued Sept. 24, 1937, and thereafter, at least for the time being, in the issue published on the last Friday of each month.

Cholera

China.—Cholera has been reported in China as follows: Week ended August 14, 1937, Canton, 48 cases; week ended August 21, 1937, Hong Kong, 433 cases, Macao, 108 cases.

Indochina—Kwangchow Wan.—On August 6, 1937, seven cases of cholera were reported in Kwangchow Wan, Indochina.

Plague

Argentina—Salta Province—Esteco.—During the period August 1–15, 1937, one case of plague was reported in Esteco, Salta Province, Argentina.

Bolivia—La Paz Department—Loayza Province.—During the month of June 1937, two cases of plague were reported in Loayza Province, La Paz Department, Bolivia.

Indochina—Pnom-Penh.—During the week ended June 26, 1937, one case of plague was reported in Pnom-Penh, Indochina.

Hawaii Territory—Island of Hawaii—Hamakua District—Hamakua Mill Sector.—Plague infection has been proved in one lot of five rats and one lot of three mice found on August 13, also in one rat found August 17, 1937, all in Hamakua Mill Sector, Hamakua District, Island of Hawaii, Hawaii Territory.

United States—California—Fresno County—Nevada—Ormsby County.—A report of a fatal case of human plague in Fresno County, California, appears on page 1289, and of plague infection in fleas in Ormsby County, Nevada, on page 1289 of this issue of PUBLIC HEALTH REPORTS.

Smallpox

Egypt—Port Said.—During the week ended July 24, 1937, one case of smallpox was reported in Port Said, Eygpt.

Unfederated Malay States—Kedah.—On July 22, 1937, smallpox was reported present in Kedah State, Unfederated Malay States.

Yellow fever

Colombia—Boyaca Department—Borbur.—During the week ended July 24, 1937, two deaths from yellow fever were reported in Borbur, Boyaca Department, Colombia.

Gold Coast—Accra.—On August 25, 1937, one case of yellow fever was reported in Accra, Gold Coast.

Senegal.—Yellow fever has been reported in Senegal as follows: August 21, one death at Diourbel; August 23, one case at Gossas.